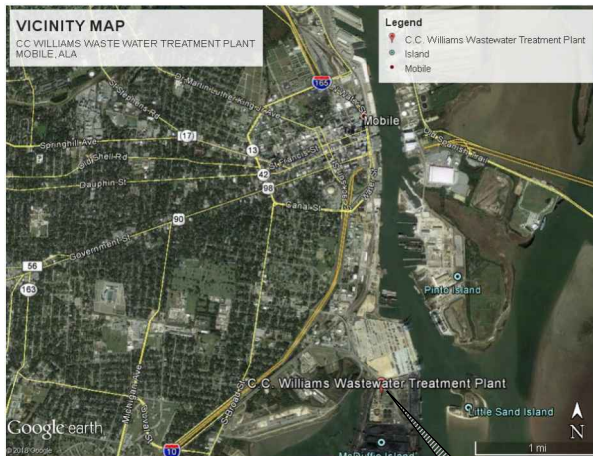


# CC WILLIAMS WWTP DEWATERING AND OTHER IMPROVEMENTS



PROJECT VICINITY MAP

CC WILLIAMS WWTP

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## PREPARED FOR THE MOBILE AREA WATER AND SEWER SYSTEM MOBILE, ALABAMA

SPECIFICATIONS  
VOLUME 1 OF 4

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# Jacobs

JACOBS D3226100

CONFORMED MAY 2021

## CONFORMED DOCUMENTS



**MOBILE AREA WATER AND SEWER SYSTEM**

**MOBILE, ALABAMA**

**BIDDING REQUIREMENTS  
AND  
CONTRACT DOCUMENTS**

for the construction of the

**CC WILLIAMS WWTP DEWATERING AND  
OTHER IMPROVEMENTS**

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**CONFORMED DOCUMENTS**

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**JACOBS  
Pensacola, FL  
May 2021**

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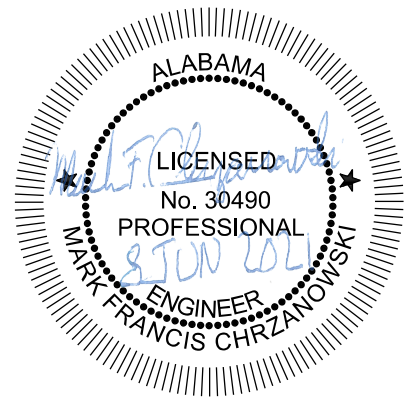
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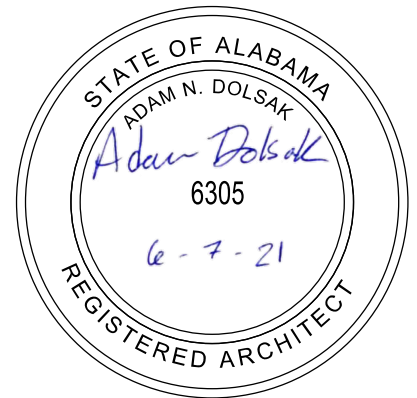
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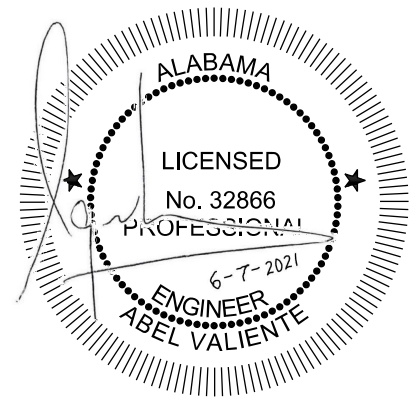
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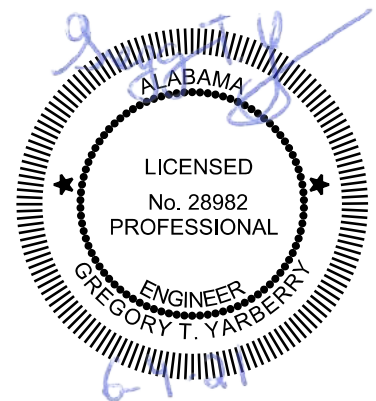
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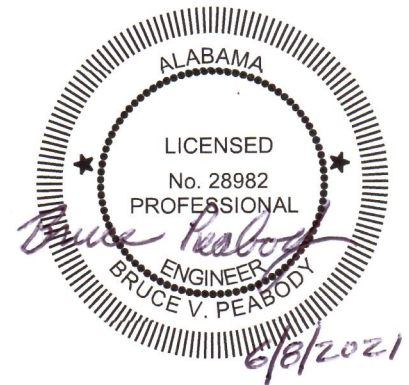
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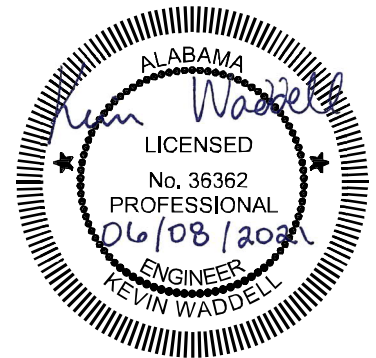
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## **PART 1**

# **MAWSS STANDARD SPECIFICATIONS**

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**BOARD OF WATER AND SEWER COMMISSIONERS  
OF THE  
CITY OF MOBILE, ALABAMA**

**STANDARD SPECIFICATIONS  
FOR  
WATER MAINS, SANITARY SEWERS  
AND  
SEWAGE PUMPING STATIONS**

**APRIL 1993**

**UPDATED MAY 2012**

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## INVITATION FOR BIDS

Sealed bids will be received by the Board of Water and Sewer Commissioners of the City of Mobile, Alabama ("Board"), at the Wesley A. James Operations Center, 4725 Moffett Road, Suite A, Mobile, AL 36618-0249 until 12:00 p.m., Local Time, May 3, 2021, and then publicly opened and read at 12:30 p.m., for furnishing all labor, materials, and performing all work for the following project: Contract No.: D3226100, Project Name: C. C. Williams WWTP Dewatering and Other Improvements Project.

The project is funded by the Alabama Department of Environmental Management State Revolving Fund (SRF) Loan Program. The selected bidder shall comply with all conditions and requirements of the program as they pertain to this Project.

Plans and Specifications may be inspected at the Board's offices at 4725 Moffett Road, Suite A, Mobile, AL, or at the offices of Jacobs Engineering (JACOBS), 25 W. Cedar Street, Suite 350, Pensacola FL. 32502. A complete set of Electronic Plans, Specifications and reference documents may be obtained via e-mail from Kara St. Myer at [Kara.StMyer@jacobs.com](mailto:Kara.StMyer@jacobs.com). Questions regarding the Contract Documents must be submitted electronically to JACOBS (via [Kara.StMyer@jacobs.com](mailto:Kara.StMyer@jacobs.com)) no later than April 16, 2021, in order for responses to be provided via addendum prior to the bid date.

A CD containing the same electronic files of the Plans, Specifications, and other Contract Documents along with select hard copy bid forms may be obtained from Kara St. Myer at JACOBS, at 25 W. Cedar Street, Suite 350, Pensacola FL. 32502, upon a non-refundable payment of \$50.00 per set. The Contract Documents may be mailed at the request of the bidder upon receipt of the \$50 payment and provided a FedEx account number is provided for the shipping charges. No Contract documents will be issued later than twenty-four (24) hours prior to bid submission time.

A MANDATORY Pre-Bid Conference will be held at Wesley A. James Operations Center, 4725 Moffett Road, Board Room, Mobile, AL 36618-0249 on April 7, 2021 at 1:00 p.m., Local Time, to discuss bidding and project requirements. Prospective bidders must attend. Subcontractors should attend. Masks must be worn. Social Distancing is required.

Bids must be submitted on the standard forms included with the Contract Documents.

Envelopes containing bids must be sealed and delivered to the Director, Board of Water and Sewer Commissioners of the City of Mobile, Alabama, 4725 Moffett Road, Suite A, Mobile, Alabama 36618-0249: "Bid for constructing Project # D3226100 - C.C. Williams WWTP Dewatering and Other Improvements Project, to be opened at 12:30 p.m., Local Time, May 3, 2021". The Bidder's Alabama State Contractor's License Number and discipline shall be on the envelope. Hand-delivered bid packages shall be delivered to the receptionist at the main entrance of the MAWSS office complex, 4725A Moffett Road, Mobile AL 36618.

Bid guarantee in the form of certified check, bid bond, or Irrevocable Letter of Credit acceptable to the Board will be required for at least 5% of the bid amount, not to exceed \$10,000.

The Board reserves the right to reject any and all bids and to waive any informality in bids received.

THIS INVITATION FOR BIDS IS CONDENSED FOR ADVERTISING PURPOSES. ADDITIONAL INFORMATION/REQUIREMENTS FOR BIDDERS CAN BE FOUND IN THE CONTRACT DOCUMENTS.

THE BOARD OF WATER AND SEWER COMMISSIONERS OF THE CITY OF MOBILE, ALABAMA





PROPOSAL

**TO: BOARD OF WATER AND SEWER COMMISSIONERS  
OF THE CITY OF MOBILE, ALABAMA**

Submitted: Monday, May 3, 2021  
(Date)

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 all Contract Documents relative thereto, and has read the Board's Standard Specifications and all General Conditions and Special Provisions furnished; and that he has satisfied himself relative to the Work to be performed.

The Bidder proposes and agrees, if this Proposal is accepted, to contract with the Board of Water and Sewer Commissioners of the City of Mobile, Alabama, in the form of contract specified to furnish all materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the following Work:

**C. C. WILLIAMS WWTP DEWATERING AND OTHER IMPROVEMENTS PROJECT  
JACOBS PROJECT NO. D3226100**

in full and complete accordance with the shown, noted, described and reasonably intended requirements of the Plans, Specifications and all other Contract Documents to the full and entire satisfaction of the Board of Water and Sewer Commissioners of the City of Mobile, Alabama with a definite understanding that no money will be allowed for extra work except as set forth in the attached General Conditions and other Contract Documents for the lump sum or unit prices listed opposite each item.

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 obligations as described in the Specifications and any details not specifically mentioned, but evidently included in the Contract shall be compensated for the item in which it most logically is included.

The Owner reserves the right to award the Contract to the lowest responsible and responsive Bidder. The basis of award for this project shall be based upon the Total Base Bid plus the total amount of additive alternates that are selected by the Owner.

Bidder will complete the work in accordance with the Contract Documents for the following price:

Twenty-one million, Three hundred & forty-two thousand, & two hundred(s) twenty-two Dollars and \_\_\_\_\_ Cents

\$ 21,342,222.00  
(numerals)

The Bidder shall include an Owner's Allowance in the amount of \$500,000.00 in the total bid price.

The Base Bid Summary is as follows:

Lump Sum Base Bid Price: \$ 21,342,222.00  
Owner's Contingency Allowance: \$ 500,000.00

TOTAL BASE BID (total of above and equal to total bid) \$ 21,842,222.00

Additive Alternate No 1. – Construction of Facility 50 - Chlorination and SO2 Building

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elect to include the construction of the Chlorination and SO2 Building along with any and all associated components as illustrated by the drawings and any additionally required efforts to complete the work as indicated in the drawings, the Contract Price will be increased in the amount of:

Three million, one hundred forty-three, three hundred ten Dollars and zero Cents  
(words)  
\$ 3,143,310.00  
(numerals)

Additive Alternate No 2. – Demolition of Facility 97 and 98 – Existing Chlorination and SO2 Buildings

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elect to include the complete demolition of the existing Chlorination and SO2 Buildings along with any and all associated components and efforts as required to complete the work as indicated in the drawings, the Contract Price will be increased in the amount of:

Fifty-five thousand, eight hundred seventy-two Dollars and zero Cents  
(words)  
\$ 55,872.00  
(numerals)



Additive Alternate No 3. – Demolition of Facility 84 – Existing Dewatering Building

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elect to include the complete demolition of the existing Dewatering Building along with any and all associated components and efforts as required to complete the work and the installation of the roadway in the area of Facility 84 as indicated in the drawings, the

Contract Price will be increased in the amount of:

One hundred thirteen thousand, three hundred & nine Dollars and zero Cents  
(words)  
\$ 113,309.00  
(numerals)

Additive Alternate No 4. – Limited Demolition of the existing Secondary Digesters

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elect to include the limited demolition of the secondary digesters along with any and all associated efforts as required to complete the work as indicated in the drawings, the Contract Price will be increased in the amount of:

Twenty-nine thousand, six hundred & forty five Dollars and zero Cents  
(words)  
\$ 29,645.00  
(numerals)

Additive Alternate No 4A. – Architectural modifications of the existing Secondary Digesters and attached building

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elect to include the architectural modifications of the secondary digesters and the attached building along with any and all associated components and efforts as required to complete the work as indicated in the drawings, the Contract Price will be increased in the amount of:

Two hundred fifty-two thousand & four hundred Dollars and zero Cents  
(words) seventy-nine  
\$ 252,479.00  
(numerals)

Additive Alternate No 5. – Architectural modifications of the existing Primary Digesters and attached building

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elects to include the architectural modifications of the secondary digesters and the attached building along with any and all associated components and efforts as required to complete the work as indicated in the drawings, the Contract Price will be increased in the amount of:

One hundred seventy-five thousand, five hundred Dollars and zero Cents  
(words) fourteen  
\$ 175,514.00  
(numerals)



Additive Alternate No 6. – Modifications of the existing Parking Area north of the Administration Building (Facility 93)

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elects to include the modifications of the existing Parking Area north of the Administration Building (Facility 93) along with any and all associated components and efforts as required to complete the work as indicated in the drawings, the Contract Price will be increased in the amount of:

Twenty-four thousand, seven hundred fifty-four Dollars and zero Cents  
(words)  
\$ 24,754.00  
(numerals)

Additive Alternate No 7. – Limited Replacement of the WWTP Fence

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elects to include the limited replacement of the WWTP Fence on the North perimeter exclusive of the main entrance along with any and all associated components and efforts as required to complete the work as indicated in the drawings, the Contract Price will be increased in the amount of:

Fifty-nine thousand, five hundred twenty-two Dollars and zero Cents  
(words)  
\$ 59,522.00  
(numerals)

Additive Alternate No 8. – Main Entry Sign

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elects to include the construction of the Main Entry Sign along with any and all associated components and efforts as required to complete the work as indicated in the drawings, the Contract Price will be increased in the amount of:

Thirty-one thousand, six hundred forty-nine Dollars and zero Cents  
(words)  
\$ 31,649.00  
(numerals)

Additive Alternate No 9. – Replacement of RTU-4 (DCU-4) PLC

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elects to include the replacement of RTU-4 (DCU-4) PLC along with any and all associated components and efforts as required to complete the work as indicated in the drawings, the Contract Price will be increased in the amount of:

Two hundred & two thousand, eight hundred seventy-five Dollars and zero Cents  
(words)  
\$ 202,875.00  
(numerals)



Additive Alternate No 10. – Additional Asphalt Overlay (Unit Price Basis)

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elects to direct and include additional asphalt milling and overlay of existing paved areas (concurrent with other paving operations) inclusive of all associated work as necessary to complete the milling and overlay, the Contract Price will be increased on a unit price basis of \$ 18.00 (numerals) per square yard in the bid quantity of 2,000 square yards for a total amount of:

Thirty six thousand, Dollars and zero Cents (words)  
\$ 36,000.00  
(numerals).

Additive Alternate No 11. – Asphalt Replacement (Unit Price Basis)

Bidder further proposes that if the Board of Water and Sewer Commissioners of the City of Mobile, Alabama elects to direct and include asphalt removal and replacement with 3" thick asphalt (concurrent with other paving operations) inclusive of all associated work as necessary to complete the replacement, the Contract Price will be increased on a unit price basis of \$ 81.00 (numerals) per square yard in the bid quantity of 200 square yards for a total amount of:

Sixteen thousand, two hundred Dollars and zero Cents (words)  
\$ 16,200.00  
(numerals).

The Owner may accept any single additive alternate or any combination of additive alternates at is sole discretion as further indicated in Section 01 11 00.

The Bidder further proposes and agrees hereby to commence the Work with an adequate force, plant and equipment at the time stated in the notice to the Contractor from the Engineers to proceed, and reach Substantial Completion of the work within 540 consecutive calendar days from and after the date stated in said notice and to achieve Final Completion of the work within an additional 30 days after Substantial Completion. (conformred per Addendum 2)

The undersigned further agrees that, in case of failure on his part to execute the said Contract and the bond within 10 consecutive calendar days after written notice being given of the award of the Contract, the check or bid bond in the amount of 5 percent of this bid accompanying this bid, and the monies payable thereon, shall be paid into the funds of the Board of Water and Sewer Commissioners of the City of Mobile, Alabama as liquidated damages for such failure; otherwise the check or bid bond accompanying this Proposal shall be returned to the undersigned:

Attached hereto is a certified check on the \_\_\_\_\_  
\_\_\_\_\_ Bank of \_\_\_\_\_  
or a Bid Bond for the sum of Five Percent (5%) of the amount of bid  
Not to Exceed \$10,000.00 Dollars (\$ \_\_\_\_\_)  
made payable to the Board of Water and Sewer Commissioners of the City of Mobile, Alabama.

By [Signature]  
(Legal Signature)

Bruce G. Creel, President  
(Printed Name and Title)

Witness: [Signature]  
(Legal Signature)

Witness: [Signature]  
(Legal Signature)

ADDRESS:

3762 Moffett Road  
Mobile, AL 36618

CONTRACTOR'S LICENSE NO:

20164

BIDDER acknowledges receipt of the following ADDENDA:

<u>One (1)</u>	<u>Four (4)</u>
<u>Two (2)</u>	<u>Five (5)</u>
<u>Three (3)</u>	



SSO AND UNPERMITTED DISCHARGE PREVENTION NOTIFICATION:

Sanitary Sewer Overflows (SSOs) and unpermitted discharges of wastewater to the environment are a violation of Federal and State laws, as well as a breach of this Contract. The Contractor and associated subcontractors, vendors, and other entities and persons chosen to complete this Work shall not, through act or omission, discharge untreated wastewater to the environment or cause wastewater to back up into a building. The Contractor hereby agrees to indemnify the Owner if the Owner is assessed penalties or fines, receives regulatory actions, or has claims, actions, or suits filed against it by any person or entity as a result of SSOs or unpermitted discharges caused by act or omission of the Contractor and/or any entity or person performing Work in the Contractor's behalf under this Contract. The Contractor shall reimburse the Owner for all damages, losses, penalties, fines, judgments, interest, costs, and expenses of every nature incurred by the Owner, including but not limited to reasonable attorney's fees, arising from or associated with each SSO or unpermitted discharge. In addition, the Contractor shall pay the following penalties to the Owner for SSOs and unpermitted discharges caused by the Contractor or any entity or person performing Work in the Contractor's behalf, regardless of whether such SSOs or discharges reach waters of the State.

<u>Estimated Volume Spilled</u>	<u>Penalty Amount</u>
0 to 10,000 gallons	\$1,000
10,001 to 25,000 gallons	\$2,000
25,001 to 50,000 gallons	\$2,500
50,001 to 150,000 gallons	\$3,000
More than 150,000 gallons	\$6,000

I, having authority to execute this document, have reviewed the above Notification, therein.

The Creel Company, Inc  
Contractor Name  
3762 Maffett Road Mobile, AL 36618  
Street City  
Bruce G. Creel  
Signature Bruce G. Creel, President





### SUBCONTRACTING PLAN

In order for your proposal to be considered, you, as Bidder, must complete all blanks in this Subcontracting Plan and sign with a handwritten signature where indicated below.

Failure to fill in the blanks on this Subcontracting Plan and/or to include a handwritten signature will be cause for rejection of your bid.

It is MAWSS's goal that in all contracts, contractors shall make a demonstrated good faith effort to award 15% of the contract amount to certified Disadvantaged Business Entities [DBE's] / Diverse Suppliers as subcontractors and/or suppliers performing commercially useful functions which are consistent with contract requirements.

Copies of MAWSS DBE Policy 16-01 [for public works projects], DBE/Supplier Diversity Policy 17-01 [for contracts for other goods and services], MAWSS's list of certified Disadvantaged Business Enterprises [DBE's] / Diverse Suppliers, and lists of organizations that have information on DBE's / Diverse Suppliers are available from MAWSS's Supplier Diversity Office (251-694-3194) or from the MAWSS website, [www.mawss.com](http://www.mawss.com).

PLEASE STATE WHAT PERCENTAGE OF THE WORK FOR THIS CONTRACT YOU PLAN TO AWARD TO DBE/DIVERSE SUPPLIER SUBCONTRACTORS AND/OR VENDORS:	(Total %) <u>14%</u>
ESTIMATED TOTAL DOLLAR AMOUNT TO BE AWARDED TO DBE/DIVERSE SUPPLIER:	(Total \$) <u>3,680,110<sup>00</sup></u>
AMOUNT BID FOR THIS CONTRACT:	(Total \$) <u>25,983,350<sup>00</sup></u>

If the above percentage is zero or is less than 15%, be sure to include your Affidavit of Contractor's Good Faith Efforts to Meet Subcontractor / Vendor Diversity Goals and all supporting documentation in your bid package.

Please list below all subcontractors and suppliers which you plan to use for this contract. Also indicate which of these are DBE's / Diverse Supplier by writing "yes" or "no" where indicated. Also list for each the percentage of the total contract amount to be performed by each and the certification group the DBE / Diverse Supplier is certified with. Attach additional sheets if needed. [If you are not using any subcontractors or vendors, you will need to write "zero" below and sign the form.]

SUBCONTRACTOR/ VENDOR NAME	DBE / Diverse Supplier? Yes or No	% OF CONTRACT AMT.	CERTIFICATION GROUP (MAWSS, ALDOT, ADECA, SRMSDC, BCIA)
<u>Moody's Elec.</u>	<u>Yes</u>	<u>14%</u>	<u>MAWSS</u>
<u>Surface Systems, Inc.</u>	<u>Yes</u>	<u>0.2%</u>	<u>New Orleans</u>
<u>Dowaghey Mech.</u>	<u>NO</u>	<u>8%</u>	<u>-</u>
<u>Tindall Precast</u>	<u>NO</u>	<u>7%</u>	<u>-</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

**CAUTION: ACCURATELY COMPLETE ALL PARTS OF THIS FORM AND SIGN BELOW:**

**WE WILL EXERCISE GOOD FAITH TO COMPLY WITH THIS PLAN AND MAWSS'S DBE REQUIREMENTS.**

The Creel Company Inc  
BIDDER  
By: [Signature]  
Bruce G. Creel, President



## CONTRACT

THIS CONTRACT is made and entered into the \_\_\_\_\_ day of 20\_\_\_\_, by  
ween    T h e    C r e e l    C o m p a n y ,    I n c .  
\_\_\_\_\_  
(Contractor)

**hereinafter “Contractor,” and the Board of Water and Sewer Commissioners of the City of Mobile, Alabama, hereinafter “Owner.”**

WITNESSETH:

The Contractor, for the consideration hereinafter fully set out hereby agrees with the Owner, as follows:

1. The Contractor shall furnish all materials and perform all Work as set forth in the following Contract Documents: Invitation for Bids, and any Addenda thereto; Proposal and all Documents submitted therewith; Standard Specifications of the Board of Water and Sewer Commissioners of the City of Mobile, Alabama; any Specifications of the Owner provide with the Invitation for Bids which are specific to this Contract; General Conditions; Special Provisions; Detailed Specifications; this Contract form; Bonds; Drawings and Addenda; all of which are attached hereto and made a part of the parties' Contract, as if fully set forth herein:

C. C. Williams WWTP Dewatering and Other Improvements Project  
Project No. D3226100

2. The Contractor shall commence performance of this Contract on a date to be specified in a written order of the Owner, and shall fully complete all Work hereunder within 570 days from and after said date. "Work" shall include all construction, delivery of materials and items, and other obligations of the Contractor under this Contract.

3. The Owner hereby agrees to pay to the Contractor for the faithful performance of the Contract, subject to additions and deductions as provided in the Specifications or Proposal, in lawful money of the United States as follows:

Approximately S twenty-one million, eight hunderd fourty two thousand, two hundred twenty two, and 00/100 Dollars (\$21,842,222.00) in accordance with lump sum and unit prices set forth in the proposal inclusive of none of the offered.

4. The Owner shall make monthly partial payments to the Contractor on the basis of a duly certified and approved estimate of Work performed during the preceding calendar month by the Contractor. The Owner may retain five percent (5%) of the amount of such estimate until fifty percent (50%) of the Work has been completed. The Owner may hold this retainage until all Work has been performed strictly in accordance with this Contract and until all Work has been accepted by the Owner, and all obligations of the Contractor under this Contract have been satisfied.

5. Upon submission by the Contractor of evidence satisfactory to the Owner that all payrolls, material bills, and other costs incurred by the Contractor in connection with the performance of this Contract have been paid in full, and upon satisfaction by the Contractor of all other obligations under this Contract, final payment on account of this Contract shall be made within thirty days (30) after the completion by the Contractor of all Work covered by this Contract and the acceptance thereof by the Owner.

6. The parties hereto acknowledge and agree that time is of the essence for performance of this Contract. The parties agree that in the event the Work is not completed within the time herein specified, the Owner may retain from the compensation otherwise to be paid to the Contractor the sum not to exceed \$1,000 per day as prescribed in the Special Conditions for each day thereafter, Sundays and holidays included, that the Work remains uncompleted. The parties agree that this dollar amount represents their agreed upon stipulation as to the damages which the Owner will have sustained per day due to the failure of the Contractor to complete the Work within the time stipulated, and that this amount is not a penalty.

7. Sanitary Sewer Overflows (SSOs) and unpermitted discharges of wastewater to the environment are a violation of Federal and State laws, as well as a breach of this Contract. The Contractor and associated subcontractors, vendors, and other entities and persons chosen to complete this Work shall not, through act or omission, discharge untreated wastewater to the environment or cause wastewater to back up into a building. The Contractor hereby agrees to indemnify the Owner if the Owner is assessed penalties or fines, receives regulatory actions, or has actions, suits, or claims filed against it by any person or entity as a result of SSOs or unpermitted discharges caused by act or omission of the Contractor and/or any entity or person performing work in the Contractor's behalf under this Contract. The Contractor shall reimburse the Owner for all damages, losses, penalties, fines, judgments, interest, costs, and expenses of every nature incurred by the Owner, including but not limited to reasonable attorney's fees, arising from or associated with each SSO or unpermitted discharge. In addition, the Contractor shall pay the penalties identified in the Contract Documents to the Owner for SSOs and unpermitted discharges caused by the Contractor and/or any entity or person performing Work in the Contractor's behalf, regardless of whether such SSOs or discharges reach waters of the State.

8. The parties hereto further agree hereto that if at any time after the execution of this Contract and the Contract Bond hereto attached for its faithful performance, the Owner shall deem the surety or sureties upon such bond to be unsatisfactory, or if, for any reason, such bond ceases to be adequate to cover the performance of the Work, the Contractor shall at its expense, within five (5) days after the receipt of notice from the Owner to do so, furnish an additional bond or bonds in such form and amount and with such surety or sureties as shall be satisfactory to the Owner. In such event, no further payment to the Contractor shall be due under this Contract until such new or additional security for the faithful performance of the Work shall be furnished in manner and form satisfactory to the Owner.

IN WITNESS WHEREOF the representatives of the parties hereto have executed this Contract by signing below, with full authority as the act of each party, to be effective as of the day and date first above written in two (2) counterparts, each of which shall, without proof or accounting for the other counterpart, be deemed an original Contract.

**BOARD OF WATER AND SEWER  
COMMISSIONERS OF THE CITY OF  
MOBILE, ALABAMA**

ATTEST

By \_\_\_\_\_  
(Legal Signature)

\_\_\_\_\_  
(Printed Name and Title)

By \_\_\_\_\_  
(Legal Signature)

\_\_\_\_\_  
(Printed Name and Title)

CONTRACTOR: \_\_\_\_\_

By \_\_\_\_\_  
(Legal Signature)

\_\_\_\_\_  
(Printed Name and Title)

\_\_\_\_\_  
(Legal Signature)

By \_\_\_\_\_  
(Printed Name and Title)

(SEAL)

**NOTARY ACKNOWLEDGEMENTS**

STATE OF \_\_\_\_\_  
COUNTY OF \_\_\_\_\_

Before me, the undersigned Notary Public in and for the above County and State, personally appeared \_\_\_\_\_, whose name as \_\_\_\_\_ for the above Owner is signed above, and who, after being by me first duly sworn, acknowledged before me that he/she signs this Contract with full authority as the act of the Owner.

Given under my hand and seal this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
[Print Name]: \_\_\_\_\_

My Commission expires: \_\_\_\_\_

STATE OF \_\_\_\_\_  
COUNTY OF \_\_\_\_\_

Before me, the undersigned Notary Public in and for the above County and State, personally appeared \_\_\_\_\_, whose name as \_\_\_\_\_ for the above Contractor is signed above, and who, after being by me first duly sworn, acknowledged before me that he/she signs this Contract with full authority as the act of the Contractor.

Given under my hand and seal this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
[Print Name]: \_\_\_\_\_

My Commission expires: \_\_\_\_\_

## **CONTRACT BOND**

KNOW ALL MEN BY THESE PRESENTS that we \_\_\_\_\_

(hereinafter the "Principal")

and \_\_\_\_\_

(hereinafter the "Surety")

are held and firmly bound unto the Board of Water and Sewer Commissioners of the City of Mobile, Alabama (hereinafter the "Board") in the penal sum of \_\_\_\_\_

Dollars (\$ \_\_\_\_\_)

for the faithful performance of a certain written Contract dated the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_, entered into between the Principal and the Board, for the following construction project or other work (hereinafter the "Contract"):

\_\_\_\_\_  
PROJECT NO. \_\_\_\_\_

a copy of which said Contract is incorporated herein by reference and made a part hereof as if fully set out.

NOW THEREFORE, this Bond and all obligations hereof shall remain in full force and effect until all covenants, terms, and conditions of the Contract for the work referenced above have been fully performed. The conditions of this Bond and its obligations are further described as follows:

The Principal shall faithfully perform all terms and conditions of the Contract and shall fully pay all obligations incurred in connection therewith. The Principal shall honor all obligations of every nature relative to the Contract.

The Principal shall save the Board harmless from any and all liability of every nature, kind, and character which may be incurred in connection with the performance or fulfillment of the Contract and from any and all other such liability resulting from negligence or otherwise on the part of the Principal and/or any entity performing work or providing materials on the Principal's behalf for the Contract. The Principal shall further save the Board harmless from all costs and damages which may be suffered by reason of the failure to fully and completely perform said Contract. The Principal shall fully reimburse and repay the Board for all expenditures of every kind and description which may be incurred by the Board in making good any and every default which may exist on the part of the Principal in connection with the performance of said Contract. The Principal shall pay all lawful claims of persons, firms, partnerships, corporations, and other entities for all labor performed and material furnished in connection with the performance of the Contract. Failure to pay any such claims of persons, firms, partnerships, or corporations shall give them a direct right of action against the Principal and Surety under this obligation.

**CONTRACT BOND**  
**PAGE 2**

Any alterations or additions which may be made under the Contract or in the Work to be done under it, or the giving by the Board of any extensions of time for the performance of the Contract, or any other forbearance on the part of either the Board or the Principal shall not, in any way, release the Principal and Surety, or either of them, their heirs, executors, administrators, successors, or assigns for their liability hereunder, notice to the Surety of any such alteration, extension, or forbearance being expressly waived.

All obligations of this Bond shall remain in full force and effect until the performance of all covenants, terms, and conditions herein stipulated, and after such performance in full, it shall become null and void.

IN TESTIMONY WHEREOF witness the hands and seal of the parties hereto on this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

Executed in two (2) counterparts.

By \_\_\_\_\_  
(Principal)

Witness: \_\_\_\_\_  
(Legal Signature)

\_\_\_\_\_  
(Printed Name and Title)

\_\_\_\_\_

By \_\_\_\_\_  
(Surety)

Witness: \_\_\_\_\_  
(Legal Signature)

\_\_\_\_\_  
(Printed Name and Title)



**LABOR AND MATERIAL BOND**

KNOW ALL MEN BY THESE PRESENTS: That we \_\_\_\_\_, as Principal, and \_\_\_\_\_ and \_\_\_\_\_, as Surety, are held and firmly bound unto the Board of Water and Sewer Commissioners of the city of Mobile, Alabama, hereafter called the "Obligee", in the penal sum of \_\_\_\_\_ Dollars (\$\_\_\_\_\_), lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, personal representatives, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, said Principal has entered into a certain Contract with said Obligee, dated the \_\_\_\_\_, day of \_\_\_\_\_ 20\_\_\_\_\_, (hereinafter called the "Contract") for the construction of:

\_\_\_\_\_  
\_\_\_\_\_  
PROJECT No. \_\_\_\_\_

which Contract and the Specifications for said Work shall be deemed a part hereof as fully as if set out herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal and all subcontractors to whom any portion of work provided for in said Contract is sublet and all assignees of said Principal and of such subcontractors, shall promptly make payments to all persons supplying him or them with labor, materials, feed-stuffs or supplies for or in the prosecution of the Work provided for in such Contract, or in any amendment or extension of or additions to said Contract, and for the payment of reasonable attorney's fees, incurred by the claimant or claimants in suits on each bond, then the above obligations shall be void; otherwise to remain in full force and effect. PROVIDED, however that this bond is subject to the following conditions and limitations.

(a) Any person, firm or corporation that has furnished labor, materials, feed-stuffs, or supplies for or in the prosecution of the Work provided for in said Contract shall have a direct right of action against the Principal and Surety on this bond, which right of action shall be asserted in a proceeding instituted in the County in which the Work provided for in said Contract

**LABOR AND MATERIAL BOND**

**PAGE 2**

is to be performed or in any county in which said Principal and Surety does business. Such right of action shall be asserted in a proceeding instituted in the name of the claimant or claimants for his or their use and benefit against said Principal and Surety or either of them (but not later than one year after the final settlement, including warranties, of said Contract) in which action such claim or claims shall be adjudicated and judgment rendered thereon.

(b) The Principal and Surety hereby designate and appoint

---

(Chief Executive Officer of Surety Company)

as the agent of each of them to receive and accept service of process or other pleading issued or filed in any proceeding instituted on this bond and hereby consent that such service shall be the same as personal service on the Principal and/or Surety.

(c) The Surety shall not be liable hereunder for damage or compensation recoverable under any Workmen's Compensation or Employer's Liability Statute.

(d) In no event shall the Surety be liable for a greater sum than the obligation of this bond, or subject to any suit, action or proceeding thereon that is instituted later than one year after the final settlement, including warranties, of said Contract.

(e) This bond is given pursuant to the terms of Act No. 39, General Laws of Alabama, approved February 8, 1935, entitled "An Act to Further Provide for Bonds of Contractors on State and Other Public Works and Suits Thereon."

**LABOR AND MATERIAL BOND**  
**PAGE 3**

Executed in two (2) counterparts.

SIGNED, SEALED AND DELIVERED THIS \_\_\_\_\_ day  
of \_\_\_\_\_, 20\_\_\_\_.

By \_\_\_\_\_  
(Principal)

(Seal)

Witness: \_\_\_\_\_  
(Legal Signature)

\_\_\_\_\_  
(Printed Name and Title)

By \_\_\_\_\_  
(Surety)

Witness: \_\_\_\_\_  
(Legal Signature)

\_\_\_\_\_  
(Printed Name and Title)

By: \_\_\_\_\_  
(Resident Agent)

\_\_\_\_\_  
(Printed Name and Title)



## SECTION 1

### **DEFINITION OF TERMS**

#### **1.01 DEFINITIONS:**

Whenever in these Specifications, or in any documents or instruments in construction operations where these Specifications govern, the following terms, or pronouns in the place of them, are used, the intent and meaning shall be interpreted as follows:

#### **1.02 AASHTO:**

The American Association of State Highway and Transportation Officials. Any reference to AASHTO standards shall be taken to mean the most recently published revision unless otherwise specified.

#### **1.03 ANSI:**

The American National Standards Institute. Any reference to ANSI standards shall be taken to mean the most recently published revision unless otherwise specified.

#### **1.04 ADDENDUM:**

An Addendum is a document which is added to the original Contract Documents during the bidding period to clarify, revise, add to, or delete from the original Contract Documents or previous Addenda.

#### **1.05 ADEM:**

The Alabama Department of Environmental Management.

#### **1.06 ADVERTISEMENT FOR BIDS:**

A document which briefly describes to prospective Bidders the title and location of Project, location of bid opening, brief description of nature and scope of Project, identities of Owner and Engineer, how to

obtain Bid Documents, deposit requirements, statement of bid security, and method of submitting bids.

#### **1.07 AGREEMENT:**

The written agreement between Owner and Contractor covering the Work to be performed; other Contract Documents are attached to the Agreement.

#### **1.08 ASTM:**

The American Society for Testing Materials. Any reference to ASTM standards shall be taken to mean the most recently published revision unless otherwise specified.

#### **1.09 AWWA:**

The American Water Works Association. Any reference to AWWA standards shall be taken to mean the most recently published revision unless otherwise specified.

#### **1.10 BID:**

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

#### **1.11 BIDDER:**

Any individual, firm or corporation submitting a Proposal for the Work contemplated, acting directly or through a duly authorized representative.

**1.12 BOARD:**

The Board of Water and Sewer Commissioners of the City of Mobile, Alabama.

**1.13 CONTRACT:**

The written agreement between the Owner and the Contractor, covering the performance of the Work and the furnishing of the labor and materials in the construction thereof. The Contract shall include, but shall not be limited to the "Invitation for Bids," "Proposal," "Plans," "General Conditions," "Standard Specifications," "Supplemental Specifications," "Special Provisions" (if any), "Contract Agreement" and "Contract Bonds," together with all the "Supplemental Agreements," "Addenda," and "Extra Work Orders" that are required to complete the Work in a substantial and acceptable manner.

**1.14 CONTRACT BID PRICE:**

The sum of the products of the quantities of the items of the Work listed in the Proposal, and the respective lump sum or unit prices bid in the Proposal.

**1.15 CONTRACT BONDS:**

The approved bonds furnished by the Contractor and his surety to guarantee completion of the Contract in accordance with its terms and prompt payment to all persons supplying him or them with labor, materials, or supplies.

**1.16 CONTRACTOR:**

The individual, firm, or corporation that has entered into a Contract awarded him by the Owner for any work covered by these Specifications, acting directly or through his agents or employees.

**1.17 COUNTY:**

The county in which the Project is being constructed.

**1.18 DEVELOPER:**

The person, firm or corporation engaged in developing or improving real estate for use or occupancy.

**1.19 DEVELOPER'S ENGINEER:**

An Engineer registered with the Alabama State Board of Registration for Professional Engineers, retained by the developer to provide professional engineering services for a project.

**1.20 DIPRA:**

The Ductile Iron Pipe Research Association.

**1.21 ENGINEER:**

An Engineer registered with Alabama State Board of Registration for Professional Engineers or his authorized representative, acting as the Owner's agent within the scope of the authority and/or the particular duties entrusted to it.

**1.22 EQUIPMENT:**

All machinery and equipment, 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.

**1.23 EXTRA WORK:**

Performance or furnishing of work or materials which is found necessary for proper completion of the improvement and which in principle is an obligation of the Contractor, but which is not covered by any item in the bid schedule in the Proposal and for which no means of payment, direct or indirect, has been provided in the Contract, and which is an obligation for which special remuneration, by an "Extra" price or by other consideration, in any case to be duly negotiated, or by "Force Account," shall be paid to the Contractor.

**1.24 EXTRA WORK ORDERS:**

Written orders approved by the Owner to the Contractor concerning the performance of work or furnishing of materials involving Extra Work as defined in these Specifications.

**1.25 LABORATORY:**

Any laboratory authorized by the Owner to test materials and work involved in the Contract.

**1.26 MATERIAL:**

Any substance proposed to be used in connection with the construction of any part of the Work and its appurtenances.

**1.27 NEMA:**

The National Electrical Manufacturers Association. Any reference to NEMA standards shall be taken to mean the most recently published revision unless otherwise specified.

**1.28 NOTICE TO PROCEED:**

Written notice from the Engineer or the equivalent thereto giving the Contractor notice of the date on which he is to begin the prosecution of the Work for which he has contracted.

**1.29 OSHA:**

The Federal Occupational Safety and Health Administration.

**1.30 OWNER:**

The Board of Water and Sewer Commissioners of the City of Mobile, Alabama.

**1.31 PLANS (DRAWINGS):**

All official, approved Plans (Drawings), which are on file with the Owner, or exact reproductions thereof, showing details of the Work covered by the Contract.

**1.32 PRODUCT:**

The term "product" as used in these Contract Documents includes materials, systems and equipment.

**1.33 PROJECT:**

The entire Work to be performed pursuant to the Contract Documents.

**1.34 PROPOSAL:**

The written offer for the Work contemplated, when submitted by the Bidder in the required manner on the prescribed Proposal Form, properly signed and guaranteed.

**1.35 PROPOSAL FORM:**

The approved prepared form on which the Owner requires the formal bids to be submitted for the Work contemplated.

**1.36 PROPOSAL GUARANTY:**

The certified check or bid bond designated in the Invitation for Bids, or in the Proposal Form, to be furnished by the Bidder to insure execution of the Contract and furnishing of the bonds for the Work contemplated, if it be awarded to him.

**1.37 RECORD DRAWINGS:**

Drawings which show details of the Work as on the Plans but which revise the Plans to include any modifications or deviations which have been approved by the Board or the Engineer and incorporated into the Work.

**1.38 RESIDENT PROJECT REPRESENTATIVE:**

The authorized representative of the Engineer who is assigned to the Project site or any part thereof.

**1.39 SAHD:**

The State of Alabama Highway Department.

**1.40 SHOP DRAWINGS:**

All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by Contractor, a subcontractor, manufacturer, supplier, distributor or other person on behalf of the Contractor, and which illustrate the equipment, material or some portion of the Work.

**1.41 SPECIFICATIONS:**

The general term comprising all the directions, provisions and requirements contained herein, together with such as may be added or adopted as General Conditions, Supplemental General Conditions, Supplemental Specifications or Special Provisions.

**1.42 STATE:**

The state in which the Project is being constructed.

**1.43 SUBCONTRACTOR:**

Any properly qualified individual, firm, or corporation 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 previously approved by the Owner.

**1.44 SUPERINTENDENT:**

The representative for the Contractor present on the Work at all times during progress, authorized to receive and fulfill instructions from the Engineer or Owner.

**1.45 SUPPLEMENTAL AGREEMENT:**

A written agreement executed by the Owner and the Contractor with the consent of the Surety covering major changes and/or revised or new prices and items and supplementing the original Contract.

**1.46 SURETY:**

The corporate body, licensed under the laws of the state, bound with and for the Contractor for the acceptable performance of the Contract and also for the payment of claims recoverable under the Contract Bonds.

**1.47 WORK:**

The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

END OF SECTION



## SECTION 2

### **PROPOSAL REQUIREMENTS AND CONDITIONS**

#### **2.01 GENERAL QUALIFICATIONS OF BIDDERS:**

All bidders acknowledge that a bidder's financial stability, its ability to furnish the necessary equipment and materials throughout the project, and the knowledge, training, and experience of its employees are important to prevent interruption of service and inconvenience to Owner, to protect the environment and public health, and to ensure completion of a quality product in the allotted time.

Bidders shall be licensed as Contractors when required by law, and shall have appropriate specialty designation(s) if required for the project.

Each bidder must be able to submit proof that bidder as an entity[whether the bidder is a person, corporation, partnership, firm, company, or other entity] as well as bidder's supervisory employees [including project superintendent, project manager, and forepersons] have had a minimum of two (2) years' experience immediately preceding the submission of the bid, performing work of a similar scope and complexity. Bidder must be able to present proof that Bidder and its supervisory employees completed this similar work in a satisfactory and safe manner.

Each bidder acknowledges that failure to present proof that Bidder as an entity and Bidder's supervisory employees have satisfactorily performed similar work for at least two (2) years immediately preceding the submission of this bid shall result in rejection of bid.

Each bidder must be able to furnish proof that it owns, or has in its possession and control, appropriate and sufficient equipment to properly and efficiently perform all work required under this contract.

#### **2.02 CONTENTS OF PROPOSAL FORMS:**

The Owner will furnish to Bidders, Specifications containing a blank Proposal Form showing description of the Work contemplated, the approximate estimate of the various quantities of the

pay items of the Work to be performed and materials to be furnished, the amount of the Proposal Guaranty, and the date, time, and place of opening of Proposals, and the time in which the Work must be completed. All papers bound with or attached to the Proposal Form are a necessary part thereof and must not be detached or altered.

#### **Failure to submit a subcontracting plan will result in your bid being considered non-responsive.**

All bidders shall submit a plan for the use of small and small disadvantaged businesses as subcontractors. The form provided with the Proposal shall be used for this purpose.

#### **2.03 INTERPRETATION OF APPROXIMATE ESTIMATES:**

Although the estimate of quantities of work listed in the Proposal Form are the results of calculations made from field surveys or other available information, they are to be considered as only approximate estimates of the quantities of the different pay items and are to be used only as a basis for comparing bids for awarding the Contract.

Such quantities, including the classification thereof, may or may not be representative of the actual conditions encountered during construction and the Owner does not guarantee that the approximate quantities given will hold strictly in the construction of the Work.

Final payment to the Contractor will be made for only the actual quantities of the respective pay items of the Work performed, at the Contract unit prices bid in the Proposal, in accordance with the Plans and Specifications, as finally determined from actual measurements made during the progress or after completion of the Work, and if, upon completion of the Work, the actual quantities of the respective pay items performed shall be more or less than the quantities estimated in the Proposal, the Contract unit prices bid in the Proposal will still prevail, except as otherwise hereinafter provided.

**2.04     EXAMINATION OF PLANS AND SPECIFICATIONS, SPECIAL PROVISIONS AND SITE OF WORK:**

All Bidders are required to examine carefully the site of the proposed Work, the Proposal Form, Plans, General Conditions, Standard Specifications, Supplemental Specifications, Special Provisions, and the Contract and Bond Forms, and it is mutually agreed that the submission of a Proposal shall be

prima-facie evidence that the Bidder has made such examination and has judged for and satisfied himself as to the conditions to be encountered as to the character, quality, and quantities of work to be performed and materials to be furnished, and as to the requirements of Plans, General Conditions, Standard Specifications, Supplemental Specifications, Special Provisions, Contract and Bonds, and as to the contingencies. Bidders shall satisfy themselves that the Work can be completed within the time set forth in the Contract. Bidders shall also familiarize themselves with and shall comply with the requirements of all federal, state, and local laws and ordinances which may directly or indirectly affect the Work or its prosecution, persons engaged in or employed on the Work, and the materials or equipment used in the Work. No adjustments or compensations will be allowed for losses caused by failure to comply with the above requirements.

**2.05     PREPARATION OF PROPOSAL:**

The Bidder's Proposal must be submitted on the Proposal Form furnished him by the Owner.

The Bidder must specify, with figures, a unit price for each of the separate items for which a quantity is given in the Proposal Form (except when alternate bids are called for on items) and shall show the products of the respective unit prices and the estimated quantities in the columns provided for that purpose, as well as the gross sum for which he will perform all of the estimated work required by these Standard Specifications, Supplemental Specifications, Special Provisions, and the Plans. The Engineer 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. The Proposal shall be properly signed by the Bidder.

**2.06     IRREGULAR PROPOSALS:**

Proposals may be rejected if they contain any omissions, alterations of form, additions not called for, conditional bids, alternate bids unless called for, incomplete bids, erasures or irregularities of any kind. Proposals in which the unit or lump sum prices bid are obviously unbalanced may be rejected.

No alteration of the terms and conditions of the sealed bid which are written upon or appended to the outside of the bid will be accepted or considered.

#### **2.07 PROPOSAL GUARANTY:**

No Proposal will be considered unless accompanied by a properly certified check or bid bond made payable to the Owner in the amount indicated in the Invitation for Bids. Cashier's checks will not be accepted in lieu thereof. The full amount of the Proposal Guaranty of a Bidder whose Proposal is accepted shall be forfeited to the Owner, in liquidation of damages, in the event of failure of the Bidder to execute Contract and Contract Bonds as stipulated herein.

#### **2.08 DELIVERY OF PROPOSALS:**

Each Proposal shall be placed, together with the Proposal Guaranty, in a sealed envelope, on the outside of which is written in large letters "Proposal for (Name of Project)" and so marked as to indicate the Project and the name of the Bidder, and the Bidder General Contractor's license number (where applicable). Proposals may be delivered in person or by mail. When sent by mail, preferably registered, the sealed Proposal, marked as indicated above, shall be enclosed in another envelope for mailing. Proposals will be received by the Owner until the hour of the date set in the Invitation for Bids for the opening thereof. No Proposal will be accepted or considered which has not been received prior to the hour of the opening date.

#### **2.09 WITHDRAWAL OR REVISION OF PROPOSAL:**

A Proposal may be withdrawn at any time prior to the hour fixed in the Invitation for Bids for opening of Proposals, provided a request in writing executed by the Bidder or his duly authorized representative is filed with the Owner prior to that time. When such Proposal is reached, it will be returned to the Bidder unopened. No Proposal can be withdrawn, modified or corrected after the hour set for opening such Proposals. Proposals received after the hour set for opening will be returned unopened.

#### **2.10 OPENING OF PROPOSALS:**

Proposals will be opened and read publicly, except when directed otherwise by the Owner, at the time and place indicated in the Invitation for Bids. Bidders or their authorized representative are invited to be present at public opening of bids.

#### **2.11 DISQUALIFICATION OF BIDDERS:**

If there is reason to believe that collusion exists among the Bidders, any or all Proposals may be rejected, and participants in such collusion may not be considered in future Proposals for the same work.

#### **2.12 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 Owner for the administration of the Contract, observation, and engineering for the Work under construction will be increased if the time occupied in the Work is lengthened. Therefore, for each day that the Work remains uncompleted after the time specified in the Contract, or additional time that may be allowed by the Owner for the completion of the Work when extra or additional work is ordered by the Owner, the amount specified in the Contract shall be paid by the Contractor to the Owner as liquidated damages for the loss sustained by the Owner because of failure of the Contractor to complete the Work within the specified time. Liquidated damages will be deducted from partial payments otherwise due the Contractor. The amount of liquidated damages shall be the amount set forth in the Contract.

END OF SECTION



## SECTION 3

### **AWARD AND EXECUTION OF CONTRACT**

#### **3.01 CONSIDERATION OF BIDS:**

After the Proposals are opened and read, the approximate estimated quantity of each item multiplied by the unit price bid for that item, the products calculated, and the gross sums bid obtained in each of the acceptable Proposals, the Contract Bid Prices will be compared and the results of such comparison will be made available to each Bidder on request. Until the final award of the Contract, however, the Owner reserves the right to reject any and all Proposals, and to waive all technicalities.

#### **3.02 AWARD OF CONTRACT:**

The award of the Contract, if it is to be awarded, will be by the Owner to the lowest responsible Bidder whose Proposal shall comply with all the requirements necessary to render it formal. The successful Bidder will be notified by letter, mailed to the address shown on his Proposal, that his bid has been accepted and that he has been awarded the Contract. Award will be made within 60 days after bids are received unless otherwise stated in the Special Provisions. This period may be extended if mutually agreeable to Owner and Contractor.

The Owner, before awarding the Contract, may require a reviewed financial statement. If, in the opinion of the Owner, this statement does not justify the award, the Owner reserves the right to reject the low bid. The reviewed financial statement shall contain, as a minimum, a review of financial statements including performing inquiry and analytical procedures that provide the Owner with a reasonable basis for expressing limited assurance that there are not material modifications that should be made to the statements in order for them to be in conformity with generally accepted accounting principles or, if applicable, with any other comprehensive basis of accounting. The financial statement shall be submitted within 10 days of the Owner's request.

Should it be necessary to eliminate part of the Work in order to award the Contract within the funds available for construction, the Owner reserves the

right to designate the portion of the Work to be omitted. The amount of deduction will be determined by multiplying the quantity of items omitted by the unit price or lump sum bid for such items, or by negotiation.

#### **3.03 RETURN OF PROPOSAL GUARANTEE:**

All Proposal Guarantees will be returned, if requested, within 30 days following the opening of Proposals; except those of the three lowest Bidders, which will be returned, if requested, after satisfactory bonds have been furnished and the Contract has been executed. The Owner reserves the right to return all Proposal Guarantees by mail and its responsibility shall end upon the mailing thereof.

#### **3.04 EXECUTION OF CONTRACT:**

The Contract shall be signed by the successful Bidder and returned to the Engineer with satisfactory Contract Bonds within 10 days after the date of Notice of Award.

#### **3.05 FAILURE TO EXECUTE CONTRACT:**

Failure to execute a Contract and file acceptable Contract Bonds within 10 days after the date of Notice of Award shall be just cause for the annulment of the award and the forfeiture of the Proposal Guaranty<sup>1</sup> as liquidation of damages sustained. Award may then be made to the next lowest responsible Bidder or the Work may be readvertised or constructed by day labor, or otherwise contracted as the Owner may decide.

#### **3.06 REQUIREMENTS OF CONTRACT BONDS:**

Prior to award of the Contract, the Contractor shall submit to the Owner the name and address of the bonding company for the approval of the Owner.

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<sup>1</sup> Revised 02/03

A Contract Bond, and a Labor and Material Payment Bond, in the forms which are included in the Contract Documents, and each in the sum as herein specified, to be duly executed at the proper time sequence by the successful Bidder as Principal and by a surety company licensed to do business under the laws of the State in which the Work is located, and satisfactory to the Owner, will be required for the faithful performance of the Contract, and the payment for labor and materials. Sureties to be acceptable must be named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. In addition, the surety company must have a rating of A- or better, as rated by A. M. Best Company.<sup>2</sup>

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 the same, the successful Bidder, to whom the Contract is awarded shall, within 10 days from the date of the award, furnish and file with the Owner an acceptable Contract Bond in the amount equal to 100 percent of the Contract Bid Price of the Contract awarded. 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 10 days, furnish and file with the Owner an acceptable surety bond for payment of labor, materials, feed-stuffs or supplies payable to the Owner in an amount not less than 100 percent of the Contract Price, with the obligation that the Contractor shall promptly make payment to all persons furnishing him or them with labor, materials, feed-stuffs, or supplies for or in the prosecution of the Work, and for the payment of reasonable attorney's fees incurred by successful claimants or plaintiffs in suits on said Bond.

If at any time, the Owner, for justifiable cause, shall be or become dissatisfied with any surety or sureties upon the Performance or Payment Bonds, the Contractor shall, within 5 days after notice from the Owner, substitute an acceptable bond (or bonds) in

such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such bond shall be paid by the Contractor. No further payments to the Contractor shall be deemed due nor shall be made until the new surety or sureties shall have furnished acceptable bond to the Owner.

In lieu of a Contract Bond and a Labor and Material Bond, the Contractor may submit an irrevocable letter of Credit (Appendix K). The letter must be completed and certified by a lending institution satisfactory to the Board. The letter shall be in the amount of 100% of the Contract amount.

### **3.07 INSURANCE:<sup>3</sup>**

**A. General:** The Contractor shall provide insurance in accordance with the required specifications.

**B. Contractor Coverage:** The Contractor shall not commence work under this 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 insurance required of the subcontractor has been obtained and approved. If the subcontractor does not take out insurance in his own name, the principal contractor shall provide such insurance protection for the subcontractor and such subcontractor's employees.

**C. Casualty Insurance:** The following insurance coverages (with limits not less than specified herein) shall be maintained by the Contractor for the duration of the Contract, affording coverage for any claim arising out of Contractor's operations herein, whether by the Contractor or by any subcontractor or by any Employee or Agent of either:

1. Claims of employees under Worker's Compensation and other similar employee benefit acts, including claims because of bodily injury, occupational sickness or disease, or death.

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<sup>2</sup> Revised and adopted 07/24/06

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<sup>3</sup> Revised and adopted 07/24/06

2. Claims arising out of bodily injury, sickness, disease, or death of any person other than employee.
3. Claims for damages arising out of libel, slander, false arrest, detention or imprisonment, malicious prosecution, defamation or violation of right of privacy, wrongful entry or eviction or other right of private occupancy, including claims as a result of an offense related to the employment of a claimant by Contractor (so-called "Personal Injury").
4. Claims arising out of damage to or destruction of tangible property, including loss of use.
5. The Contractor shall furnish certification of insurance and policies verifying that the above coverages are in effect before commencing any work, and that each policy is endorsed to give the Owner 30 days notice in writing in the event of cancellation or material change therein.

Policies of Insurance shall state that the Owner and the Owner's employees be named as additional insureds on the Contractor's Automobile Liability and Commercial General Liability policies.

In respect to Worker's Compensation, a Waiver of Subrogation shall be issued in favor of the Owner. Where applicable, the U.S. Longshore and Harborworkers Compensation Act Endorsement shall be attached to the policy. Where applicable, the Maritime Coverage Endorsement (to include coverage under Jones Act) shall be attached to the policy. Both the U. S. Longshore and Harborworkers and the Maritime Coverage shall have limits equal to or greater than the employer's liability coverage.

6. Rated by AM Best – A- or better. For non-admitted companies, a rating of A or better by AM Best.
  - a. At the discretion of the Board, worker's compensation insurance may be placed through a qualified worker's compensation self-insurance fund.

#### **b. Limits of Liability:**

<u>Type of Insurance</u>	<u>Bodily Injury</u>
Worker's Compensation	Statutory
Employers' Liability	\$500,000 Each Accident; \$500,000 By Disease, Policy Lmt \$500,000 Disease, Each Employee
Commercial Automobile	\$1,000,000 Each Accident. Bodily Injury and Property Damage Combined  Business auto includes all owned, leased, hired and non-owned automobiles.

#### **Commercial General Liability:**

\$1,000,000 per Occurrence  
\$1,000,000 Personal &  
Advertising Injury  
\$2,000,000 General  
Aggregate per project  
\$2,000,000 Products &  
Completed Operations  
Aggregate  
\$100,000 fire damage liability

#### **Umbrella Liability:**

In addition to the basic limits previously set out for Commercial General Liability, Products and Completed Operations, Automobile Liability and Worker's Compensation and Employer's Liability, Contractors shall provide Umbrella Liability limits of \$5,000,000 per occurrence and aggregate.

Coverage shall be issued with a "pay on behalf of" wording, including Personal Injury and other extensions, and provide coverage at least as broad as that afforded by the primary insurance policies.

#### **Extensions:**

Blanket Contractual Liability  
Personal Injury  
Blanket Collapse and Underground Coverage  
Broad Form Property (including Completed Operations)  
Employees as Additional Insureds  
Host Liquor Liability  
Non-owned Watercraft Liability  
Worldwide Products

Fire Legal Liability  
Incidental Medical Malpractice  
Extended Bodily Injury (Assault and Battery)  
Newly Acquired Organizations

When and if the use of explosives for blasting purposes appears necessary or desirable, such methods shall not be undertaken without written authorization of the Owner, and then only provided that acceptable extensions of liability coverage have been obtained specifically to include the explosion ("X") hazard and the collapse ("C") hazard.

The policy of general liability shall include the special underground property damage coverage (providing the so-called "U" hazard) on a blanket basis.

**D. Owner's Protective Liability:** The Contractor shall furnish from a carrier acceptable to the Owner, a policy of liability insurance, commonly called "Owner's Protective Liability" in the name of the Board of Water and Sewer Commissioners of the City of Mobile, d/b/a MAWSS, providing "Independent Contractor's Coverage" for the operations embraced by this Contract with limits of \$1,000,000 bodily injury and \$1,000,000 property damage. Policy shall be endorsed that the premium is to be paid by the named Contractor

**E. Property Insurance - Contractor:**

1. The Contractor shall assume complete responsibility for safe-guarding all portions of the Work in progress, whether completed or not, until such work has been accepted by the Owner, and shall maintain such insurance to protect himself against perils which may cause such property to be damaged or destroyed. This coverage shall be similar to the former All Risks of Physical Loss Form, including, if available, Collapse. Title to such work in progress, whether completed or not, shall remain vested in the Contractor until finally accepted by the Owner.
2. **Coverage Form** - Coverage shall be provided on an actual completed value Builder's Risk Form or, if more appropriate, an installation floater in the joint name of the Contractor and Owner for the duration of the Contract.

3. The Owner has the option of providing Builder's Risk coverage for any projects undertaken by a Contractor. If the Owner exercises this option, the Contract Proposal will appropriately indicate this and provide for separately showing the cost of the Builder's Risk coverage in the Bid.

**3.08 INDEMNITY PROVISIONS:**

The Contractor shall indemnify and hold harmless the Owner and the Engineer and their agents and employees from and against all claims, damages, losses, demands, payments, suits, actions, recoveries and judgments of every nature and description and expenses including 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 attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom; and (2) is caused in whole or in part by a 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.

The Contractor shall assume all risk and bear any loss or injury to property or persons occasioned by neglect or accident during the progress of Work until the same shall have been completed and accepted. He shall also assume all blame or loss by reason of neglect or violation of any state or federal law or municipal rule, regulation or order. The Contractor shall give to the proper authorities all required notices relating to the Work, obtain all official permits and licenses and pay all proper fees. He shall make good any injury that may have occurred to any adjoining building, structure or utility in consequence of the Work.

In any and all claims against the Owner or 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 obligation under the "INDEMNITY PROVISIONS" shall not be limited in any way by any limitation on the amount or types of damages, compensation or benefits payable by or for the Contractor or any subcontractor under



workmen's compensation acts, disability benefit acts or other employee benefit acts.

The obligations of the Contractor under Paragraph 3.08 shall not extend to the liability of the Engineer's negligent acts, errors or omissions, or those of his employees or agents.

END OF SECTION



## SECTION 4

### **SCOPE OF WORK**

#### **4.01 INTENT OF PLANS AND SPECIFICATIONS:**

The true intent of the Plans, Specifications, and Special Provisions is to prescribe a complete Work or improvement which the Contractor undertakes to do, complete in every detail, in full compliance with the Plans, General Conditions, these Specifications, the Supplemental Specifications, the Special Provisions, Proposal, Contract and Invitation for Bids, together with all authorized alterations, Supplemental Agreements and Extra Work Orders. The Contractor shall perform all items of the Work covered and stipulated in the Contract, Specifications, and Plans, shall remove all obstructions from the right of way, and shall do such special, additional, extra, and incidental work as may be considered necessary to complete the Work and its appurtenances, or structures, to the finished lines, grades, cross sections and dimensions shown on the Plans or as modified by written orders of the Engineer, in a satisfactory and acceptable manner. The Contractor shall furnish, unless definitely and expressly provided to the contrary in the Proposal, Special Provisions or Plans, all material, implements, machinery, equipment, tools, supplies, transportation and labor necessary to the prosecution and completion of the Work.

#### **4.02 UNDERGROUND AND EXISTING UTILITIES:**

The Plans show structures, certain features of the topography, and certain underground utilities, but they do not purport to show all features, lines, or obstructions. Such topography and notes in the Plans were inserted from records available, and are for the Contractor's convenience only. The Contractor shall verify the existence and location of surface topography, underground structures, and utilities to assure conflicts will be avoided in the construction of this Work. The Contractor shall conduct prudent underground explorations in advance of his work in order to make adjustments to the Work if necessary.

The Contractor shall protect, maintain and keep in service all existing utilities and service connections during construction operations. Any existing utility lines cut or damaged shall be repaired immediately and the service restored at the Contractor's expense.

#### **4.03 ALTERATION OF PLANS OR CHARACTER OF WORK:**

The Owner or his authorized representative may without notice to the Surety make, without change in the unit prices, alterations in the Plans or in the nature of the Work which they may consider necessary or desirable during the progress of the Work to complete fully and acceptably the proposed construction, provided that such alterations do not materially change the general features of the original Plans and Specifications. Material changes shall be understood to mean those changes in the original Plans and Specifications made necessary by the exigencies of the Work resulting in the alteration of cost to the Contractor by an amount which could not have been foreseen at the time of his bidding upon the Work. The Owner reserves the right for the Engineer to revise any part of the alignment, grades, structures, width, and other dimension on the Work, if the Engineer deems it advisable and such changes shall not be considered material changes. The Owner also reserves the right for the Engineer to increase or decrease the quantity of any or all of the items listed in the estimate of approximate quantities in the Proposal Form and such increase or decrease shall not be considered as a waiver of any of the conditions of the Contract or Contract Bonds.

#### **4.04 EXTRA WORK:**

In connection with the Work covered by the Contract, the Owner or his authorized representative may at any time during its progress order other work or materials incidental thereto. If any such work and material is not listed as a pay item with a Contract Unit Bid Price or if compensation therefor is not included in the Contract unit prices bid for other pay items under the terms of the Contract, it will be

designated as Extra Work, and shall be performed by the Contractor as directed, provided, however, that before any Extra Work is started the Engineer shall furnish the Contractor a Proposal Form, stating the location, kind and estimated quantity of Extra Work to be done. The Contractor shall indicate on this Proposal Form the compensation (unit price, or lump sum) for which he will perform the Extra Work and this Proposal shall be submitted to the Owner for approval. The Owner may approve the Proposal, in which case it shall be an authorization for doing the Work and shall become a part of the Contract, but if the Owner considers the price submitted for any item of the Extra Work excessive and a satisfactory adjustment price cannot be reached for such item, it shall be optional with the Owner to terminate the Contract insofar as it applies to such item or Extra Work in question and perform such Extra Work by other agents or other means or to direct that the Contractor performs the Work on a "Force Account" basis. Claims for payment for Extra Work not so authorized may be rejected by the Owner.

#### **4.05     CONSTRUCTION AND MAINTENANCE OF DETOURS:**

No road or section of road shall be closed to traffic except with the written permission of the Engineer and the governing authority, and no construction operations that will in any way inconvenience the traveling public shall be started until adequate provisions have been made to detour or bypass traffic in safety and comfort. All detours shall be approved by the Highway Department, City Engineer or the official having jurisdiction over the roads or streets.

The Contractor shall maintain all detours for traffic over the Work. Unless otherwise provided in the Special Provisions, the road, while undergoing improvement, shall be kept continuously open to public traffic and in passable and safe condition.

When the Contractor hauls materials over any detour or public road, he shall so regulate his loads that the capacity of the road and its structures is not exceeded and he shall be responsible for any specific damage that may result to the road or its structures from failure to observe regulations governing traffic thereon.

#### **4.06     REMOVAL AND DISPOSAL OF STRUCTURES AND OBSTRUCTIONS:**

Unless otherwise provided, the Contractor shall remove at his expense any existing above or below-ground structure or part of structure, fence, building, or other encumbrance or obstruction upon or within the limits of the Work, which interferes in any way with the new construction. Compensation for the removal of any structure not listed as a pay item in the Proposal with a Contract Bid Price shall be included in the Contract unit prices bid for the pay items of the Work.

#### **4.07     FINAL CLEAN-UP:**

Upon completion and before Work will be finally accepted and final payment made, the Contractor shall clean and remove from the Work and adjacent property, stream channels, sites of structures, and all areas occupied by him in connection with the Work, all weeds, shrubs, stumps, portions of trees, and all other forms of objectionable organic matter; all useless, surplus, excavated or discarded materials; and all loose rock, boulders, falsework, temporary structures, machinery and equipment. He shall restore in an acceptable manner all property, both public and private, which has been damaged during the prosecution of the Work, and shall leave the Work and sites of structures in a neat presentable condition throughout the Project. Depositing any material on abutting property with or without the consent of the property owner will not be considered a satisfactory method of disposal.

#### **4.08     MAINTENANCE OF THE WORK DURING CONSTRUCTION:**

The Contractor shall be required to maintain the Work from the date of the approval of his Contract until the Work is completed and shall maintain it in first-class condition for 30 days after it is completed and until the Work is finally accepted.

The maintenance shall consist of continuous and effective work prosecuted day by day, with adequate equipment and forces to the end of the Project, keeping the entire work site in satisfactory and acceptable condition at all times. The Contractor shall take adequate precautions to protect trees,

shrubs, plants, and existing site improvements from injury during construction operations and shall maintain adequate drainage and utility service during his work.

Compensation for maintenance work during construction and before the Work is finally accepted shall be included in the Contract unit prices bid on the pay items of the Work and the Owner will not pay additional for such work.

#### **4.09    FAILURE TO MAINTAIN WORK:**

The failure of the Contractor, at any time, to comply with the above provisions for maintenance of the Work will result in the following:

**First:**    The Owner, or his authorized representative, will immediately notify the Contractor, his superintendent or employees to comply with the required maintenance provisions.

**Second:**   In the event the Contractor fails to remedy his lack of or unsatisfactory maintenance within 24 hours after the date of issuance of this notice, the Owner may proceed immediately with adequate forces and equipment to maintain in a satisfactory and acceptable manner the Work site, and the entire cost of this maintenance will be deducted from monies due or that become due the Contractor on this Contract.

**Third:**   As an alternate to the Owner's taking over the maintenance, all the quantities of the Work performed which are not properly maintained may be deducted from the Contractor's current payment request even if such quantities have been allowed on a previous estimate.

**END OF SECTION**



## SECTION 5

### CONTROL OF WORK

#### 5.01 AUTHORITY OF THE ENGINEER

To prevent misunderstandings, disputes, and litigation, the Engineer shall decide any and all questions which arise concerning the quality and acceptability of materials furnished and work performed, the rate of progress of the Work, interpretation of the Plans and Specifications, and the acceptable fulfillment of the Contract on the part of the Contractor. The Engineer will determine the amount, quantity, classification, and quality of the several kinds of work performed and materials furnished which are to be paid for under the Contract and his decision and estimate shall be conclusive and binding on both parties thereto and such decision and estimate of the Engineer, in case any questions arise, shall be a condition precedent to the right of the Contractor to receive any money due him under the Contract. Explanations concerning the meaning of the Plans and Specifications and Contract, all directions necessary to complete or make definite the Plans, Special Provisions, Specifications or Contract and to give them due effect, will be given by the Engineer and his findings shall be final and binding on both parties hereto. The Engineer shall have authority to enforce and make effective decisions and orders as apply to conformance with the Contract. He shall decide disputes and mutual rights between Contractors.

Notwithstanding any general clauses, wording, paragraphs, or other references contained in the Plans, Specifications, General Conditions, or elsewhere in the Special Provisions, the Engineer and his Resident Project Representative are not charged with the responsibility of directing the actual procedures and detail methods of construction to be used by the Contractor in accomplishing the Work contained in the Contract between the Owner and the Contractor; nor is the Engineer responsible to act as superintendent, foreman, or safety engineer for the Contractor, nor for the safety of the Contractor's personnel.

#### 5.02 PLANS AND SHOP DRAWINGS:

General drawings, showing such details as are necessary to give a comprehensive idea of the construction contemplated will be included in the approved Plans. The approved Plans will be supplemented by such working drawings as are necessary to adequately define the Work. It is mutually agreed that all authorized alterations affecting the requirements and information given on the approved Plans shall be in writing.

After checking and verifying all field measurements, Contractor shall submit to Engineer for review, five copies of all Shop Drawings, plus the number of copies Contractor wishes to have returned to him after Engineer's review, collated according to the organization of the accepted schedule of Shop Drawings, which will bear a stamp or specific written indication that Contractor has satisfied Contractor's responsibilities under the Contract with respect to Contractor's review of the submission. All submissions will be identified as "Shop Drawings" on the outermost enclosure and show Project name and Engineer's Project number. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, descriptive data, diagrams specified performance, design criteria, materials, and similar data to enable Engineer to review the information as required.

Contractor shall also submit to Engineer for review and approval, with such promptness as to cause no delay in Work, all samples required by the Contract. All samples will have been checked by and accompanied by a specific written indication that Contractor has satisfied Contractor's responsibilities under the Contract with respect to the review of the submission and will be identified clearly as to material, supplier, pertinent data such as catalog numbers, and the use for which intended.

Before submission of each Shop Drawing or sample, Contractor shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar data with respect thereto and reviewed or coordinated each Shop Drawing or sample with other Shop Drawings and samples and with the requirements of the Work and the Contract.

At the time of each submission, Contractor shall give Engineer specific written notice of each variation that the Shop Drawings or samples may have from the requirements of the Contract, in addition, shall cause a specific notation to be made on each Shop Drawing submittal to Engineer for review and approval of each such variation. When the Contractor does call such deviation to the attention of the Engineer, the Contractor shall state in his letter whether or not such deviations involve deductions or extra cost adjustments.

Engineer will review with reasonable promptness Shop Drawings and samples, but Engineer's review will be only for conformance with the design concept of the Project and for compliance with the methods, techniques, sequences, or procedures of construction (except where a specific means, method, technique, sequence, or procedure of construction is indicated in or required by the Contract Documents). The review of a separate item will not indicate approval of the assembly in which the item functions. Contractor shall make corrections required by Engineer, and shall return the required number of corrected copies of Shop Drawings and submit, as required, new samples for review. Contractor shall direct specific attention in writing to revisions other than the corrections called for by the Engineer on previous submittals.



Engineer's review of Shop Drawings or samples shall not relieve Contractor from responsibility for any variation from the requirements of the Contract unless Contractor has, in writing, called Engineer's attention to each such variation at the time of submission, and Engineer has given written approval of such variation by a specific written notation thereof incorporated in or accompanying the Shop Drawings or sample; nor will any review by Engineer relieve Contractor from responsibility for errors or omissions in the Shop Drawings.

The Contractor shall furnish five complete sets of the corrected copies of Shop Drawings including parts list, operation and maintenance manuals, lubrication charts and descriptive literature for all equipment. No payment shall be made to the Contractor for any specialties or equipment unless Shop Drawings have been approved by the Engineer. Final payment under the Contract will not be made until all specified documents have been submitted for equipment.

Compensation for furnishing all Shop Drawings and samples shall be included in the Contract Unit Prices for the pay items of the Work and such Drawings and samples shall be furnished by the Contractor without additional compensation.

#### 5.03 MANUFACTURER'S DRAWINGS:

The manufacturer's drawings of any special materials required for the job shall be submitted to the Engineer for review prior to installation.

#### 5.04 CONFORMITY WITH PLANS AND ALLOWABLE DEVIATIONS:

Finished work in all cases shall conform with lines, grades, sections, details and dimensions of the Work contemplated as shown on the approved Plans except as modified in writing by the Engineer. Any deviation from the approved Plans and working drawings that may be required by the exigencies of the construction will be determined by the Engineer and authorized in writing.

In cases where minor deviations within the limits shown on the Plans or contained in the Specifications will be in the best interest of the Owner or present a more finished or aesthetic appearance, then the Contractor shall notify the Engineer or his representative before the Work progresses to a point where the change cannot be effected without incurring additional expense to the Owner.

#### 5.05 COORDINATION OF PLANS, SPECIFICATIONS, AND SPECIAL PROVISIONS:

The Specifications, Supplemental Specifications, General Conditions, Plans, Special Provisions, and all supplementary documents are essential parts of the Contract, and 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, figured dimensions, unless obviously incorrect, shall govern over the scaled dimensions. Supplemental Specifications shall govern over the Standard Specifications. Plans shall govern over Specifications; Special Provisions shall govern over both Specifications, Supplemental Specifications and Plans.

The Contractor shall take no advantage of, and shall promptly notify the Engineer if he discovers, any error or omission of dimensions in the Plans, or of any discrepancy between the Plans and Specifications. The Engineer will make such corrections and supply omitted dimensions as may be necessary and his interpretation shall be final.

When supplementary specifications such as Federal, ASTM, ANSI, AASHTO, AWWA, etc., are referenced in these Specifications, such references shall be the latest edition of such supplementary specifications.

#### 5.06 COOPERATION OF THE CONTRACTOR:

The Contractor will be supplied with no more than four copies of the Plans, Specifications, Supplemental Specifications, and Special Provisions. If additional copies of documents are required, the Contractor shall reimburse the Engineer for the actual cost of reproduction of documents as requested.

The Contractor shall have available on the Work, at all times, one copy of each of said Plans, Specifications, Supplemental Specifications, and Special Provisions. He shall give the Work the constant attention necessary to facilitate the progress thereof and shall cooperate with the Engineer, Engineer's Resident Project Representative, and with other Contractors in every way possible.

The Contractor shall at all times have a competent Superintendent on the Work, capable of reading and thoroughly understanding the Plans and Specifications, as his agent on the Work, with full authority to execute the Work without delay and to supply promptly such materials, tools, plant equipment, and labor as may be required. Such Superintendent shall be furnished irrespective of the amount of work subcontracted and shall have authority over all subcontract work.

The Contractor shall schedule and conduct his work and dispose of his material as to avoid causing unnecessary inconvenience and delay to other Contractors engaged on adjacent work and so as to join his work to that of other Contractors in a proper manner, and in accordance with the spirit of the Plans and Specifications, and so as to perform his work in the proper sequence in relation to that of other adjacent work. Each Contractor shall so conduct his operation and maintain the Work in such condition that adequate drainage shall be effected at all times.

It is mutually agreed that in case of a dispute arising between two or more Contractors engaged on the same work as to the respective rights of each under these Specifications, the Engineer shall determine the matters at issue and shall define the respective rights of the various interests involved in order to secure completion of all parts of the Work in general harmony and with satisfactory results, and his decision shall be final and binding on all parties concerned and shall not in any way be a cause for claims for extra compensation by any of the parties.

#### 5.07 CONSTRUCTION SURVEYS:

The Engineer will establish bench marks and horizontal control points. From these points, Contractor shall lay out the Work by establishing all lines and grades at the site necessary to control the Work, and shall be responsible for all measurements that may be required for the execution of the Work. Second order leveling shall be used by the Contractor in establishing elevations, and all levels shall be looped in or closed. All survey data shall be recorded in accordance with standard and approved methods. All field notes, sketches, and computations made by the Contractor in establishing control points for his work shall be available to the Engineer at all times.

The Contractor shall furnish, at his expense, all stakes, pins, platforms, equipment and labor as may be required in laying out any part of the Work from the control points established by the Engineer. It shall be the responsibility of the Contractor to maintain and preserve all stakes and other markers established by him until authorized to remove them. If any of the control points established by the Engineer are destroyed by or through negligence of the Contractor, they may be replaced by the Engineer, and the expense of replacement will be deducted from any amount due or which may become due the Contractor.

#### 5.08 RESIDENT PROJECT REPRESENTATIVES:

The Engineer may appoint such Representatives as he desires, and they shall be granted full access to the Work and to mills and factories in which material is being prepared for use under the Contract. They shall have authority to request compliance with terms of the Contract, to approve or reject materials, to make measurements of quantities, to keep records of costs, and otherwise represent the Engineer. The Contractor may appeal from their decisions to the Engineer, pending settlement but no work shall be done in any manner contrary to the Contract on items affected by such appeal. If the Contractor refuses to comply with instruction of the Representative to fulfill the requirements of the Contract, the Representative shall, if possible, immediately notify his immediate superior and obtain instructions. Failing in this, if the Contractor refuses to suspend operations on verbal order, he shall issue a written order suspending the Work on items affected, giving in detail the reasons for suspension. Immediately after placing the order in the hands of the person in charge for the Contractor, he shall report to his immediate superior, or in his absence to the Engineer, for further instructions.

Representatives shall not be authorized to revoke, alter, enlarge, relax or release any requirements of the Special Provisions, Specifications, or Contract; to approve or accept any portion of the Work; nor to issue instruction contrary to the Plans and Specifications; nor shall they act as superintendent, foreman, or safety engineer for the Contractor nor for the safety of the Contractor's personnel; or interfere with the management of the Work. Any advice which they may give the Contractor shall not be construed as binding the Owner in any way, nor releasing the Contractor from fulfilling all the terms of the Contract.

#### 5.09 INSPECTION:

All materials and workmanship shall be subject to inspection, examination, and test by the Representatives of the Owner, or the Engineer, at any and all times. The Owner, or the Engineer, shall have the right to reject defective materials and workmanship or require correction thereof. Rejected materials shall be promptly and satisfactorily replaced with proper materials and rejected workmanship shall be promptly and satisfactorily corrected. If the Contractor fails to proceed at once with the replacement of rejected materials or the correction of rejected workmanship, the Owner may, by Contract or otherwise, replace such materials or correct such workmanship and charge the cost thereof to the Contractor. Failure of Representatives to find defects or to request removals shall in no way relieve the Contractor of responsibility.

The Contractor shall furnish the Engineer with every reasonable facility for ascertaining whether or not the Work performed and materials used are in accordance with the requirements and intent of the Specifications and Contract. At any time before final acceptance of the Work, the Contractor shall, if the Engineer requests, remove and uncover such portions of the finished work as the Engineer may direct. After the examination, the Contractor shall restore said portions of the Work to the standard required by the Contract. If the work thus exposed or examined proves acceptable, the uncovering or removing and replacing of the covering or making good of the parts removed, shall be paid for as Extra Work, but, if the work so exposed or examined proves unacceptable, no compensation will be allowed the Contractor for the uncovering or removing and the replacing of the covering or making good of the parts removed. No work shall be done nor material used without suitable inspection by the Engineer, or his representative.

Failure to find or reject any defective work or material shall not prevent later rejection when such defect be discovered, or obligate the Owner to Final Acceptance.

#### 5.10 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK:

All work which has been rejected shall be remedied, or else removed and replaced in an acceptable manner by the Contractor at his own expense, and no compensation shall be allowed him for such removal or replacement. Any work done without the lines and grades shown on the Plans or as given, as herein provided, or any Extra Work done without written authority will be considered as unauthorized and at the expense of the Contractor and will not be measured or paid for. Unauthorized work shall be removed and replaced at the Contractor's expense. Upon failure on the part of the Contractor to immediately comply with any order of the Engineer made under the provisions of the Section, the Owner shall have authority to cause defective work to be remedied, or removed and replaced, and unauthorized work to be removed and to deduct the cost from any monies due or to become due the Contractor. In case no such monies are available, the amount shall be charged against the Contractor's Surety.

#### 5.11 DISPUTED CLAIMS:

In any case where the Contractor wishes to make claim to the Owner for extra compensation for work or materials he deems not clearly covered in the Contract or not ordered by the Engineer as Extra Work, the Contractor shall notify the Engineer or the Owner in writing, of his intention to make claim for such extra compensation, before he begins the work on which he bases his claim. If such notice is not given, or if the notice is given and the Engineer is not afforded proper facilities for keeping strict account of the actual cost to the Contractor, then the Contractor hereby agrees to waive claim for such extra compensation. Such notice by the Contractor, and the fact that the Engineer has kept account of the cost shall in no way be construed as establishing the validity of the claim. When the work has been completed, the Contractor shall immediately file his claim with the Engineer.

#### 5.12 CONTRACTOR INITIATED CHANGES:

The Contractor and his subcontractor must submit in writing any requests for modifications to the Plans and Specifications. Shop Drawings that are submitted to the Engineer for his review do not constitute "in writing" unless it is brought to the attention of the Engineer that specific changes are being suggested.

#### 5.13 PROJECT COMPLETION:

The Work shall be complete when all pay items and any Extra Work to be performed under this Contract is performed in its entirety and in accordance with contractual requirements.

#### 5.14 FINAL CONSTRUCTION INSPECTION:

Whenever the Engineer considers the Work provided and contemplated by the Contract is nearing completion, or within 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 advise the Contractor in writing as to the Work to be done or the particular defects to be remedied. When these defects have been remedied and the Work has been satisfactorily completed the Engineer shall make the Final Inspection, and shall notify the Contractor in writing that the Final Inspection has been made and that time charges end on the day of Final Inspection. Maintenance Period shall start on the day after this Final Inspection.

#### 5.15 FINAL ACCEPTANCE:

After the Final Inspection is made as outlined above, the Contractor shall maintain the Work for 30 days in the same manner as set forth under "Maintenance of the Work During Construction." The Work will be finally accepted at the end of the 30 day maintenance period provided all work has been satisfactorily maintained.

The Contractor, immediately after receiving the letter of Final Inspection, shall give notice of said completion of Work by an advertisement in some newspaper of general circulation published within the city or county wherein the Work has been done for a period of four successive weeks. Proof of publication of said notice shall be made by the Contractor to the Owner, by affidavit of the publisher and a printed copy of the notice published. If no newspaper is published in the county where the Work is done, the notice may be given by posting at the Court House for 30 days and proof of same shall be made by the probate judge or sheriff and the Contractor.

In no instance shall a final settlement be made upon the Contractor until the expiration of the Maintenance Period and until the Contract is completed and Project accepted by the Owner.

5.16 MAINTENANCE GUARANTEE AFTER ACCEPTANCE:

Neither the final certificate of payment nor any provisions in the Contract, nor partial or entire use or occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with the Contract or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the Work and pay for any damage to other work resulting therefrom which shall appear within a period of two years from the date of final acceptance of the Work unless specified otherwise by the Owner. The Owner will give notice of observed defects with reasonable promptness and the Contractor shall repair the defects immediately. The Contractor's Performance or Contract Bond shall remain in effect and cover this guarantee. After completion of the Project and prior to final acceptance, the Contractor shall provide a statement addressed to the Owner from his/her Surety acknowledging that the Contract Bonds will remain in effect during the two year warranty period or as otherwise required by the Owner. Final payment under the contract will not be made until this statement is received.

For projects involving the lining of sewer mains and laterals, a ten year warranty shall be provided in lieu of a two year warranty. The requirements stated above for a two year warranty shall also hold true for the ten year warranty.

5.17 CONTRACT CLOSEOUT DOCUMENTS:

The Contractor shall complete and submit to the Engineer the following contract closeout requirements:

- A. Final pay estimates releasing retainage
- B. Final summary Change Order (if necessary to reconcile contract).
- C. Notarized copy of contractor's advertisement of Notice of Completion.
- D. The Contractor's Affidavit of Payment of Claims and Debts.
- E. The Contractor's Consent of Surety Company to Final Payment.
- F. The Contractor's letter acknowledging that acceptance of final payment constitutes a waiver of all claims, present or future, in connection with the referenced project.

- G. The Contractor's letter of guarantee that all defects in materials and workmanship for a period of two years, or as otherwise specified by the Owner, commencing on the date of final acceptance and acknowledgment that the Contractor's Material and Performance Bond shall remain in effect to cover this guarantee period.
- H. Contractor's DBE Utilization Report Form
- I. Video Inspection reports in proper format and medium wholly reviewed by Consultant to ensure pipe alignment and condition are acceptable (If Applicable).
- J. Record drawings reviewed and approved by Consultant (1 paper / 1 digital).
- K. Pump capacity and pressure start-up data on record drawings (If Applicable).
- L. Complete set of project shop drawings reviewed by Consultant.
- M. Consultant letter stating erosion on the project is properly addressed and is not expected to be a future liability for the Board.
- N. Letter from City or County accepting street restoration (If Applicable).
- O. Bacteriological test results (If Applicable).
- P. Hydrostatic test results (If Applicable).
- Q. Vacuum test results (If Applicable).
- R. If any purchased items have been incorporated in the work, the Contractor must furnish a letter on his letterhead assigning these warranties to the Owner.
- S. A detailed listing of warranty items with serial numbers shall be provided by the Contractor.
- T. Pre-construction video.
- U. Punch List – signed and completed.
- V. Certified Pump Curves (If Applicable).
- W. Manhole Certifications (If Applicable).

END OF SECTION





## SECTION 6

### **CONTROL OF MATERIAL**

#### **6.01 SOURCE OF SUPPLY AND QUALITY OF MATERIALS:**

All materials proposed to be used may be inspected or tested at any time during their preparation and use. Only materials conforming to the requirements of the Specifications shall be incorporated in the Work. Material which has become in any way unfit for use, shall not be used in the Work. Any material which has become mixed with or coated by dirt or other foreign substance shall not be used in the Work.

The source of supply of each of the materials shall be approved by the Owner's representative before the delivery is made to any section of the Work. When so indicated or directed, representative preliminary samples of character and quality shall be submitted for examination or test, and written approval of the quality of such samples must be received by the Contractor prior to obtaining materials from the respective sources of supply.

#### **6.02 SAMPLES AND TESTS:**

Inspection and tests will be conducted promptly but the Contractor shall notify the Owner's representative, in writing, immediately on the placing of orders for materials, giving the source and the dates when shipments are to be made. Materials to be tested will be sampled by the authorized representative, upon delivery, or at any time before use and acceptance or rejection will be based on the test of such samples.

In any event, material actually incorporated in the construction must meet the requirements of the Contract. The Contractor shall afford such facilities for collecting and forwarding samples; but shall not make use of nor incorporate in the Work any material represented by the samples until the tests have been made and the materials found acceptable in accordance with the requirements of the Contract. The Contractor in all cases shall furnish the required samples without charge.

When tests are made at the source of production, the producer shall furnish every reasonable facility for the performance of the tests and for the protection of testing equipment and supplies, and shall permit the Owner's representative to have free access to all parts of the plant to enable adequate inspection and

selection of samples. Sources of supply of bituminous material shall have adequate testing facilities and satisfactory laboratory equipment, which equipment shall meet the requirements of the standard methods mentioned in the Specifications.

#### **6.03 STORAGE OF MATERIALS:**

Materials shall be stored so as to insure the preservation of their quality and fitness for the Work in a manner as recommended by the manufacturer and approved by the Engineer. Materials in storage shall be so arranged as to facilitate prompt inspection. Stored materials even though approved before storage may be inspected prior to their use in the Work and shall meet the requirements of the Specifications at the time they are incorporated in the Work.

Materials shall be stored only where specifically permitted. Stockpiling of construction materials shall be confined to such cleared areas as may be approved. Private property shall not be used without written permission of the property owner or lessee.

#### **6.04 DEFECTIVE MATERIALS:**

All materials not conforming to the requirements of the Contract shall be considered as defective and all such materials, whether in place or not, shall be rejected and shall be removed immediately from the site of the Work. Defective materials discovered in the process of the Work will be rejected. All defective material shall be replaced by the Contractor at his expense. No rejected materials, the defects of which have been subsequently corrected, shall be used until written approval has been given by the Owner's representative. Upon the failure of the Contractor to comply at once with any order under the provisions of this Section, the Owner shall have authority to remove and replace defective material and to deduct cost of removal and replacement from any monies due or which may become due the Contractor or his Surety.

#### **6.05 CONTRACTOR'S TITLE TO MATERIALS:**

No materials or supplies for the Work shall be purchased by the Contractor or by any subcontractor

subject to any chattel mortgage or order and conditional sale contract or other agreement by which an interest is retained by the seller. The Contractor warrants that he has good title to all materials and supplies used by him in the Work, free from all liens, claims or encumbrances.

END OF SECTION

## SECTION 7

### **LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC**

#### **7.01 LAWS TO BE OBSERVED:**

The Contractor shall at all times observe and comply with all federal, state, and local laws, ordinances, orders, decrees, and regulations existing or enacted subsequently to the execution of the Contract which in any manner affect the prosecution of the Work. The Contractor and his Surety shall indemnify and save harmless the Owner and all their representatives, agents, and employees against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself, his employees, or his subcontractors.

#### **7.02 PERMITS, TAXES, LICENSES, LAWS AND ORDINANCES:**

The Contractor shall procure all permits, certificates, and licenses, pay all charges, royalties and fees, and give all notices necessary and incident to the due and lawful prosecution of the Work. The Contractor shall pay all applicable federal, state, and local sales, use or other category of tax that may be imposed. He shall comply with all federal, state and local laws, ordinances or rules and regulations relating to the performance of the Work.

A permit must be obtained from the MAWSS engineering department prior to any construction activity taking place within easements or rights-of-way which contain water and/or sanitary sewer mains. Application for the permit must be in the form specified. A detailed set of plans and specifications must be submitted with the application. Following a review of the plans, MAWSS will issue a permit for the construction activity. The permit may be issued subject to the modification of the plans to include provisions to safeguard the sanitary sewer system from damage during construction and to minimize the possibility of future maintenance activities.

#### **7.03 PATENTED DEVICES, MATERIALS AND PROCESSES:**

If the Contractor is required or desires to use any design, device, material, or process covered by letters, patents or copyrights, he shall arrange and provide for such use by suitable agreement with the patentee or owner, and a copy of the agreement shall be filed with the Owner. Whether or not such

agreement is made or filed, the Contractor and the Surety shall indemnify and save harmless the Owner, the Engineer, and all their authorized representatives from any and all suits, costs, penalties, or claims for infringement by reason of the use of any such patented design, device, material, or process, or any trademark or copyright in connection with the Work agreed to be performed under the Contract, and shall indemnify the Owner, the Engineer and all their authorized representatives for any costs, expenses, and damages which he or they may be obligated to pay by reason of such infringement or alleged infringement at any time during the prosecution or after the completion of the Work.

#### **7.04 SANITARY 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 rules and regulations of the State Board of Health or of other authorities having jurisdiction, and shall permit no public nuisance.

#### **7.05 PUBLIC CONVENIENCE AND SAFETY:**

No road or street shall be closed by the Contractor to the public except by written permission of the authority having jurisdiction, and except while so closed, the Contractor shall maintain traffic over, through or around the Work included in this Contract, with the maximum practical convenience, for the full 24 hours of each day of the Contract, whether or not work has ceased temporarily. The Contractor shall notify the Engineer at the earliest possible date after the Contract has been executed, and in any case before the starting of any construction that might in any way inconvenience or endanger traffic, so that the necessary arrangements may be determined.

The convenience of the general public and of residents along the road shall be provided for in a reasonably adequate and satisfactory manner. Where existing roads are not available for use as detours, unless otherwise provided in the Special Provisions, all traffic shall be permitted to pass through the Work. The Contractor shall provide and maintain at his own expense such temporary roads as may be necessary to provide convenient access to driveways, houses, buildings, or other property abutting the

Work under construction, as well as temporary approaches to, and crossings of, intersecting roads.

The Contractor shall arrange his work so that no undue and prolonged blocking of business establishments will occur.

Whenever possible all materials unloaded on the job sites will be placed in an area well away from the traveling public in order to avoid hazardous conditions.

Materials and equipment stored on the roads shall be so placed and the Work at all times shall be so connected as to insure minimum danger and obstruction to the traveling public.

In order that all unnecessary delay to the traveling public may be avoided, the Contractor shall provide and station competent flagmen whose sole duties shall consist of directing and controlling the movement of public traffic either through or around the Work.

Fire hydrants shall be accessible at all times to the Fire Department. No materials or other obstruction shall be placed closer to a fire hydrant than permitted by ordinances, rules or regulations, or within 5 feet of a fire hydrant, in the absence of such ordinances, rules, or regulations. In case of city or town work, the Contractor shall give the Chief of the Fire Department, City Engineer, and other appropriate local officials at least 24 hours notice in writing before it becomes necessary to obstruct a cross street.

#### **7.06 CROSSING RAILROADS:**

No work of any character shall be commenced on the railroad right of way until the Railroad Company has been duly notified by the Contractor of the date he proposes to begin work and until an authorized representative of the Railroad Company is present, unless the Railroad Company waives such requirement.

#### **7.07 INGRESS AND EGRESS:**

In areas where there is access to residences, businesses, public and private buildings, and other facilities, the Contractor shall plan his work to afford access to property abutting the Work at all times except when absolutely necessary, including providing immediate backfill of pipe, shells for temporary surfacing, and adequate signing and flagmen to control and direct traffic. The Contractor shall submit his method of operation for approval

before starting work on the Project. There will be no direct payment for this Work, with payment included in the bid for other items of work in the Contract.

#### **7.08 BARRICADES, DANGER, WARNING AND DETOUR SIGNS:**

The Contractor shall at his own expense, provide, erect, paint and maintain all necessary barricades of the material and design to meet the requirements of the State Highway Department, Public Works Department, City Engineering Department, or other officials having jurisdiction. Also, at his own expense, the Contractor shall provide suitable and sufficient red lights, torches, reflectors or other danger signals and signs, provide a sufficient number of watchmen and take all the necessary precautions for the protection of the Work and safety of the public.

The Contractor shall erect warning signs beyond the limits of the Project as required, but at least 300 feet beyond each end of the Project and at least 300 feet in advance of any place on the Project where operations interfere with the use of the road by traffic. Barricades shall be kept well painted, and suitable warning signs shall be placed thereon. All barricades and obstructions shall be illuminated at night and all lights or devices for this purpose shall be kept burning from sunset to sunrise.

#### **7.09 PRESERVATION AND RESTORATION OF PROPERTY, TREES, MONUMENTS, ETC:**

The Contractor shall not enter upon private property for any purpose without first obtaining permission from the Owners and the lessees. The Contractor shall be responsible for the preservation of all public and private property, monuments, signs, telephone lines, roads, highways, streets, other utilities, etc., along and adjacent to the Project; shall use every precaution necessary to prevent damage to pipes, conduits and other underground structures; and shall protect carefully from disturbance or damage all land monuments and property marks until an authorized agent has witnessed or otherwise referenced their location and shall not remove them until directed. The Contractor must obtain all necessary information in regard to existing utilities and shall give notice in writing to the Owners or proper authorities in charge of streets, gas and water pipes, electric and other conduits, railways, poles and pole lines, manholes, catch basins, fixtures, appurtenances, and all other property that may be affected by the Contractor's operations at least 48 hours before his operations will

affect such property. The Contractor shall not hinder or interfere with any person in the protection of such work, or with the operation of utilities at any time.

The Contractor shall not remove, injure, cut or destroy trees, shrubs, or plants that are to remain on the streets or those which are privately owned without proper authority.

When or where any direct or indirect damage or injury is done to public or private property by or as a result of any act, omission, neglect, or otherwise of the Contractor, he shall make good such damage or injury in an acceptable manner.

The Contractor shall examine all bridges and culverts, on or near the Work, over which he will move his materials, implements or equipment and shall take such precautions as are necessary to properly strengthen such structures to prevent damage before he uses them. The Contractor shall be responsible for any and all damages, caused by his operation to such bridges and culverts.

#### **7.10 RESPONSIBILITY FOR DAMAGE CLAIMS, ETC:**

The Contractor and Surety shall save harmless the Owner and all his representatives from all suits, actions, or claims of any character brought on account of any injuries or damages sustained by any person or property in consequence of performing any work in connection with this Project, or of any neglect in safeguarding the Work, or of any delay in completing the Work or of the use of any unacceptable or defective materials, or of any other act or omission either similar or dissimilar to the above enumerated acts, by said Contractor or his agent by which any person or property is injured through the fault of the said Contractor or his agents.

The Contractor shall report to the Owner all accidents occurring on the Work within 48 hours after their occurrence. The report shall contain complete information on the accident including names, addresses of persons involved and names and addresses of witnesses.

#### **7.11 RIGHT-OF-WAY:**

All right-of-way and easements for the Work will be provided without cost to the Contractor unless otherwise specified with ingress and egress at public roads and streets. If the Contractor desires other points of entry, he shall secure the written permission

of the property owners and pay any cost relative thereto.

#### **7.12 INTERFERENCE OF CONTRACTORS:**

The right is reserved by the Owner to award any work not included in the Contract to another for performance during the progress of this Contract, or to perform such work with their own forces, and the Contractor for this Contract shall so cooperate and conduct his operation as to minimize the interference therewith. Where two or more Contractors are employed on related or adjacent work, each shall conduct his operations in such a manner as not to cause any unnecessary delay or hindrance to the other. Each Contractor shall be responsible to the other for any damage, injury, loss or expense which may be suffered on account of interference of operations, neglect or failure to finish the Work at the specified time, or for any other cause.

If, through acts of neglect on the part of the Contractor, any other Contractor, subcontractor or vendor shall suffer loss or damage or assert any claim on the Work, the Contractor agrees to settle with such other Contractor, subcontractor or vendor by agreement or arbitration if such other Contractor, subcontractor or vendor will so settle. If such other Contractor, subcontractor or vendor shall assert any claim against the Owner on account of any damage alleged to have been sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim.

#### **7.13 CONTRACTOR'S RESPONSIBILITY FOR WORK:**

Until the final acceptance of the Work by the Owner as evidenced in writing, it shall be in the custody and under the charge and care of the Contractor and he shall take every necessary precaution against injury or damage to any part thereof by 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, restore and make good at his own expense all injuries or damages to any portion of the Work occasioned by any cause before its completion and acceptance and shall bear the expenses thereof.

#### **7.14 CONTRACTOR'S RESPONSIBILITY FOR COMPLETION:**

The Contractor shall accept ultimate responsibility for completion and final acceptance of the overall Project including work done by subcontractors and

material and equipment provided by vendors and suppliers. The Contractor shall be responsible for coordination of Project execution in order to prevent duplication of work, omissions, and other intercontract conflicts. References to duties and responsibilities of subcontractors, vendors, suppliers, etc., within the Specifications are intended to be addressed through the general Contractor's overall responsibility.

#### **7.15 PERSONAL LIABILITY OF PUBLIC OFFICIALS:**

In carrying out any of the provisions of the Contract or in exercising any power or authority granted thereby, there shall be no liability upon the Engineer or his representatives, either personally or as officials of the Owner, it being understood that in such matters they act as agents and representatives of the Owner.

#### **7.16 NO WAIVER OF LEGAL RIGHTS:**

The Owner or the Engineer shall not be precluded or stopped by any measurement, estimate or certificate made or given by either of them before or after the completion and acceptance of the Work and payment therefore, pursuant to any measurement, estimate or certificate, from showing the true and correct amount and character of the Work performed and materials furnished by the Contractor; or from showing at any time that any such measurement, estimate or certificate is untrue or incorrectly made in any particula; or from showing at any time that the Work or materials or any part thereof, do not conform in fact to the Contract. The Engineer shall have the right to reject the whole or any part of the aforesaid work or materials should the said measurements, estimate or payment be found, or be known, to be inconsistent with the terms of the Contract, or otherwise improperly given; and the Owner shall not be precluded from demanding and recovering from the Contractor and his Surety such damages as it may sustain by reason of the Contractor's failure to comply with the terms of the Contract. Neither the acceptance by the Engineer, or any representative, or employee; nor any certificate by the Engineer for payment of money; nor any payment for nor acceptance of the whole or any part of the Work by the Owner, or Engineer; nor any extension of time; nor any possession taken by the Owner or its employees, shall operate as a waiver of any portion of the Contract or of any power herein reserved by the Owner or of any right to damages herein provided, nor such any breach of the Contract be held to be a waiver of any other or subsequent breach.

#### **7.17 USE OF CHEMICALS:**

All chemicals used during Project construction or furnished for Project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must be clearly identified and show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with manufacturer's instructions or government regulations as applicable.

#### **7.18 DUST CONTROL:**

The Contractor shall at all times provide for the control of dust within residential areas and such other areas where dust is a nuisance to the public by sprinkling with water or by other approved dust control measures. Water shall be provided by the Contractor. No direct compensation will be made for water or other dust control measures, payment for which shall be included in the price bid for other items of work except where a specific pay item is included in the Proposal.

#### **7.19 SAFETY AND HEALTH REQUIREMENTS FOR CONSTRUCTION:**

The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (P.L. 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (P.L. 91-54) and any amendments or additions thereto, where excavation and trenching are required the contractor shall comply with the requirements of OSHA Excavation and Trenching Safety Regulations (29 CFR Part 1926 – Excavation, Final Rule), and any amendments or additions thereto.

The Contractor shall be familiar and comply with the Board's Safety Rules Handbook in so far as it augments the specific regulation referred to in this Section.

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

- A. All employees on the Work and other persons and organizations who may be affected thereby.
- B. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and
- C. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal relocation or replacement in the course of construction.

The Contractor shall comply with all applicable Laws and Regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to above in Paragraphs 2 and 3 caused, directly or indirectly, in whole or in part, by Contractor any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by the Contractor. The Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor that the Work is acceptable.

The Contractor shall designate a responsible representative at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated in writing by the Contractor to the Owner. The Contractor shall procure the referenced safety and health regulations, shall keep them on file at the job site, and shall require all supervisory personnel to become familiar with them.

#### **7.20 BRACING:**

In the event that the Contractor or his surety deems it necessary, desirable, or for other reasons to open sheet or close sheet the trenches, the sheeting shall be accomplished in such a manner that the pipe will be protected at all times. Such sheeting shall remain in

place until the backfill is carried to a point at least 2 feet above the top of the pipe. The Contractor shall exercise every precaution in removing the sheeting in order to avoid damaging the pipe. Should there be evidence that the removal of sheeting would damage the pipe, the sheeting shall be left in place. The top of sheeting left in place shall be at least 12 inches below the finished ground. There will be no payment for this item.

#### **7.21 WETLANDS:**

The Contractor shall have a thorough knowledge of all wetland regulations and shall be able to determine if wetland areas are encountered during construction. If construction is determined to be in a wetland area or adjacent to a wetland area, the Contractor shall comply with all wetland regulations.

**END OF SECTION**





## **SECTION 8**

### **PROSECUTION AND PROGRESS**

#### **8.01 SUBLETTING OR ASSIGNING OF CONTRACT; SUBCONTRACTORS**

a. Subletting or Assignment. The Contractor shall not sublet, assign, transfer, convey, sell or otherwise dispose of any portion of the Contract, his right, title, or interest thereon or his power to execute such Contract, to any person, firm, or corporation without written consent of the Owner, and such written consent shall not be construed to relieve the Contractor of any responsibility for the fulfillment of the Contract. In case the Contractor assigns all or any part of any monies due or to become due under the Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior liens of all persons, firms, and corporations for services rendered or materials supplied for the performance or the Work called for in the Contract.

b. Subcontractors.

The Contractor may utilize the service of Specialty Subcontractors on those parts of the work which, under normal contracting practices, are performed by the Specialty Subcontractors.

The Contractor shall not award any Work to any subcontractor without prior written approval of the Owner. As part of the submittals with the Contractor's bid for award of the Contract, the Contractor must include a Subcontracting Plan form with a brief description of the proposed award to each subcontractor, including such information as the Owner may require. Award of the Contract by the Board is acceptance of the submitted Subcontracting Plan unless Contractor is notified otherwise by the Board's authorized designated representative.

The Owner reserves the right to decline to approve a subcontractor proposed on a bidder's Subcontracting Plan if the Owner, in its sole discretion, has concerns as to the quality of past work performed by the subcontractor on any job; the subcontractor's willingness or ability to adhere to ordinances, other laws, and/or court orders affecting the environment or other matters relative to the Work; or any other matter which may adversely affect the Owner's customers, the general public, or the Owner's systems, facilities, or property.

If the Owner, acting through its authorized designated representative, declines to approve a subcontractor proposed in a Subcontracting Plan submitted by an otherwise responsible and responsive bidder, the bidder will be given an opportunity as set forth herein to propose a different subcontractor or to withdraw the bid without penalty. The Owner's representative will provide the bidder with written notice [via e-mail, certified mail, or hand delivery] that the proposed subcontractor is not approved, and

the bidder will then have five (5) business days from receipt of the notice in which to deliver to the Owner's representative an amended Subcontracting Plan proposing a different subcontractor. The contractor shall not change the amount of his bid when submitting a revised Subcontracting Plan. If the bidder delivers an amended Subcontracting Plan, the Owner's representative will have authority to accept the amended Subcontracting Plan and recommend award of the Contract, or to decline to accept the substitute subcontractor and recommend award to the next lowest responsible and responsive bidder. Or, the bidder may withdraw its bid without penalty prior to the end of this 5-day period. This opportunity to propose a new subcontractor within the 5-day period as set forth herein is ONLY for situations in which the Owner has rejected a proposed subcontractor for reasons stated in the preceding paragraph. In no other circumstances will a bidder be permitted to change a proposed contractor after bid opening but before contract award. **This provision shall not be interpreted to allow a bidder to add a DBE subcontractor to its Subcontracting Plan after bids have been opened but before contract award.**

The Contractor acknowledges the Owner's responsibilities for providing water and sewer services to its customers, complying with environmental and other laws, and protecting its systems, facilities and properties. The Contractor will ensure that its contracts with all subcontractors incorporate by reference the Standard Specifications, General Conditions, and other Contract Documents of the contract between the Owner and the Contractor, including but not limited to this Section 8.01.

Nothing herein is intended to limit the responsibilities of the Contractor for directing the work and performance of its subcontractors or for the quality of work, compliance with laws and court decrees, safety, or any other responsibilities of the Contractor as reflected in the Contract and or as required by construction industry standards.

The Contractor shall be as fully responsible to the Owner for the acts and omissions of the subcontractors, and of personnel either directly or indirectly employed by them, as the Contractor is for the acts and omissions of persons directly employed by Contractor.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to the Contractor by the terms of the General Conditions and other Contract Documents insofar as applicable to the Work of subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise of the Contractor under any provision of the Contract Documents.

Nothing contained in this Contract shall create any contractual relation between any subcontractor and the Owner, nor shall it create any obligation on the part of the Owner to pay or to see to the payment of any moneys due any subcontractor, except as may be otherwise required by law.

#### **8.02    NOTICE TO PROCEED:**

The Owner will, after executing the Contract, issue to the Contractor in writing or by wire a Notice to Proceed. The beginning of the time allotted for the Contract completion will be 10 days after the date of the Notice to Proceed, or the day on which Work is actually started, whichever occurs first.

#### **8.03    NOTICE AND SERVICE THEREOF:**

Any notice to any Contractor from the Owner relative to any part of this Contract shall be in writing to the said Contractor at his last given address, or delivered in person to said Contractor or his authorized representative on the Work.

#### **8.04    PROSECUTION OF WORK:**

The Contractor shall begin the Work to be performed under the Contract within 10 days after issuance of the Notice to Proceed, and he shall give the Engineer definite notice of his intention to start work at least 72 hours in advance of beginning work. During the progress of the Work, the Contractor shall notify the Engineer at least 24 hours before he expects to be ready to undertake any particular features of the Work in order that proper inspection may be provided.

The Contractor must continuously and diligently prosecute the Work in such order and manner to complete the Work in the specified time. The Contractor shall employ an ample force of men and provide construction plant properly adapted to the Work and of sufficient capacity and efficiency to accomplish the Work in a safe and workmanlike manner at the rate of progress deemed necessary to insure its completion within the time set forth in the Contract. Each operation shall be begun as soon after the Contract is awarded as conditions will permit. Each class of work will be expected to progress from the date it is begun until completed. All plant and equipment shall be maintained in good working order and provision shall be made for immediate emergency repairs.

Should the Contractor fail to maintain a satisfactory rate of progress, the Owner will require that additional men and/or plant be placed on the Work, or a reorganization of plant layout be effected in order that the Work be brought up to the required progress schedule and maintained there. Should the Contractor fail to furnish suitable or sufficient tools, machinery, equipment or force for the proper prosecution of the Work, the Owner may withhold all estimates which are may become due until their orders are complied with or the Contract may be annulled as hereinafter provided.

Should the prosecution of the Work be discontinued by the Contractor, with the consent of the Owner, the Contractor shall notify the Engineer in writing at least 24 hours before resuming operations.

#### **8.05    CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES:**

Immediately after execution and delivery of the Contract, and before the first partial payment is made, the Contractor shall deliver to the Owner an estimated construction progress schedule in the form satisfactory to the Owner, showing the proposed dates of commencement and completion of each of the various subdivisions of work required under the Contract Documents and the anticipated amount of

each monthly payment that will become due the Contractor in accordance with the progress schedule. The Contractor shall also furnish the Owner: (a) a detailed estimate giving a complete breakdown of lump sum prices; (b) periodic itemized estimates of work done for the purpose of making partial payments thereon; and (c) a schedule of Shop Drawings submissions. The cost incurred in making up any of these schedules will be used only for determining the basis of partial payments and will not be considered as fixing a basis for additions to or deductions from the Contract Price.

#### **8.06 LIMITATIONS OF OPERATIONS:**

The Contractor shall at all times conduct the Work in such manner and in such sequence as will insure the least practicable interference with traffic. He shall not open up work to the prejudice of work already started. The Contractor shall furnish the section on which work is in progress before work is started on any additional section.

Whenever work being done by other Contractors is contiguous or related to the Work included in the Contract, the respective rights of the various interests involved shall be established by the Engineer in order to secure the completion of the various portions of the Work in general harmony.

#### **8.07 CHARACTER OF WORKMEN AND EQUIPMENT:**

All subcontractors, superintendents, foremen, and workmen employed by the Contractor shall be competent and reliable. All workmen must have sufficient skill and experience to properly perform the Work assigned them. All workmen engaged on special work or skilled work, or in any trade shall have had sufficient experience and ability in such work to properly and satisfactorily perform it and operate the equipment involved, and shall make due and proper effort to execute the Work in the manner prescribed in the Contract. The Owner may demand the dismissal of any person employed by the Contractor in, about, or upon the Work who misconducts himself or is incompetent or negligent in the due and proper performance of his duty, or who neglects or refuses to comply with the Contract; and such person shall not again be employed thereon without the written consent of the Owner. Should the Contractor continue to employ or re-employ any such person, the Owner may withhold all estimates, which are or may become due or he may suspend the Work until the Contractor complies with such orders.

The methods and appliances used, the labor employed, and the machinery and equipment used shall be of sufficient size and in such mechanical condition as to meet the requirements and produce a satisfactory quality and quantity of work, shall be adequate to complete the Contract within the time specified in the Contract. No change in the machinery and equipment employed on the Work, which shall have the effect of decreasing its capacity, shall be made. The measure of the capacity of machinery and equipment shall be its actual performance on the Work.

In case the actual progress shall fall behind the estimated progress at any time, or should it become apparent that the Contractor will be unable to complete the Contract at the time and in the manner specified in the Contract, the Owner may require that additional equipment be placed on the Work.

Should the Contractor fail to furnish suitable or sufficient tools, machinery, equipment or force for the proper prosecution of the Work, the Owner may withhold all estimates which are or may become due until their orders are complied with or the Contract may be annulled as hereinafter provided.

Equipment used on any portion of the Work shall also be such that no injury to the roadway, adjacent property, utilities, structures or other highways will result from its use.

#### **8.08 TEMPORARY SUSPENSION OF WORK:**

The Owner shall have the authority to suspend the Work wholly or in part for such period as may be deemed necessary, due to unsuitable weather, or other essential conditions which are unfavorable for the suitable prosecution of the Work, or for failure on the part of the Contractor to carry out instructions, or to perform any provision of the Contract or on account of any other conditions, which make it impracticable to secure satisfactory work. No additional compensation shall be paid the Contractor because of such suspension. The Contractor shall immediately respect the written order of the Owner or his authorized representative to suspend the Work, wholly or in part. Upon suspension, the Work shall be put in proper and satisfactory condition, carefully covered and properly protected. The Contractor shall not suspend the Work without such authority and the Work shall be resumed when conditions are favorable and methods are corrected when instructed in writing, and the Contractor shall notify the Engineer when he proposes to resume work, sufficiently in advance of such time, so as to afford the Engineer opportunity to re-establish field representation.

Should the progress of the Work be stopped by a temporary injunction, court or restraining order, process or judgment of any kind directed to either of the parties hereto, then such period of delay shall not be charged against the Contract Time nor shall the Owner be liable to the Contractor because of such delay or termination of Work.

If for any reason it should become necessary to stop work for an indefinite period, the Contractor shall store all materials in such a manner that they will not obstruct or impede the traveling public or become damaged in any way, and he shall provide suitable drainage and take every precaution to prevent damage to or deterioration of the Work performed.

#### **8.09 DETERMINATION AND EXTENSION OF CONTRACT TIME FOR COMPLETION OF WORK:**

A. When the time for completion of the Work in the contract is based upon working days, the number of working days will be specified in the Proposal Form.

A working day is defined as any day when, in the opinion of the Engineer, soil and weather conditions are such as would permit effective work on any of the current major or controlling operations of the Project with at least 80% of the labor and equipment normally engaged on such major or controlling operations for at least 5 hours or more. If conditions are such as to stop work in less than this time, the day will not be counted as a working day. Sundays, national holidays, and holidays legal in the State shall be excluded from the count of working days. Contract working days shall start on the date stipulated in the Notice to Proceed and the Engineer shall be the sole judge of working days that elapse

between the date stipulated in the Notice to Proceed and the actual commencing of operations by the Contractor. In computing the time required by the Contractor in the execution of the Work, allowance will be made for days not considered working days. However, no allowance shall be made for delays or suspension of the Work due to fault of the Contractor. Each week the Engineer shall give written notice to the Contractor, or to his representative in charge of the Work, of the number of working days the Engineer has determined there were in the weekly period covered by such notices. Any objection by the Contractor to such weekly decision shall be deemed waived, shall not thereafter be made the basis for any claim, unless the Contractor shall within 3 days of receipt of such notice file with the Engineer written protest setting forth his objections and specifying the reason therefore.

In case the final estimate exceeds the Contract Bid Price an extension in the work days will be granted the Contractor. This extension shall be in direct proportion to the amount of total overrun in dollars, that is, the percentage of overrun shall first be computed and the Working Days shall be increased by the same percentage.

B. When time set for completion of the Work is based upon calendar days, working days are not applicable and no extension of time beyond the calendar date will be made, except that where the final estimate exceeds the Contract Bid Price, and extension in calendar days will be granted the Contractor. This extension shall be in direct proportion to amount of total overrun in dollars as above provided.

Time shall not be charged for maintenance after the Final Construction Inspection in case of either A or B.

#### **8.10 FAILURE OR DELAY IN COMPLETING WORK ON TIME:**

Time is an essential element in the Contract, as delay in 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. Should the Contractor, or, in case of default, the Surety fail to complete the Work within the time stipulated in the Contract, or within such extra time as may be allowed as herein above provided, a deduction of the amount stipulated in the Contract for Liquidated Damages will be made for each and every calendar day that such Contract remains uncompleted after the calendar date specified for completion or after the expiration of the number of working days allowed for completion. The said amount stipulated in the Contract is hereby mutually agreed upon as liquidated damages.

Permitting the Contractor to continue and finish the Work or any part of it after the calendar date specified for completion or after the expiration of the number of Working Days allowed for completion, after any extension of time, shall not operate as a waiver on the part of the Owner of the rights of the Owner under this Contract.

In any suit for collection of, or involving the assessment of, liquidated damages, the reasonableness of the amount per day stipulated in the Contract shall be presumed. The liquidated damages referred to herein are intended to be and are cumulative, and shall be in addition to every other remedy now or hereafter enforceable at law, in equity, by statute, or under the Contract.

#### **8.11 DEFAULT OF CONTRACT:**

If the Contractor fails to begin the Work under Contract within the time specified, or fails to perform the Work with sufficient workmen, equipment, or materials, to insure its prompt completion, or performs the Work unsuitably, or neglects or refuses to remove materials or perform anew such work as shall be rejected as defective and unsuitable, or discontinues the prosecution of the Work, or from any other cause whatsoever does not carry the Work in an acceptable manner, or becomes insolvent or is adjudicated as bankrupt, or commits any act of bankruptcy or insolvency, or allows any final judgment to stand against him unsatisfied for a period of 10 days, the Owner or his representative may give notice in writing by registered mail to the Contractor and the Surety of such delay, neglect, or default. If within 10 days after such notice the Contractor does not proceed to remedy to the satisfaction of the Owner the fault specified in said notice, or the Surety does not proceed to take over the Work for completion, the Owner shall have full power and authority, without impairing the obligation of the Contract or the Contract Bonds, to take over the completion of the Work; to appropriate or use any or all material and equipment on the ground that may be suitable and acceptable; to enter into agreements with others for the completion of the Contract according to the terms and provisions thereof; or to use such other methods as in its opinion may be required for the completion of the Contract. The Contractor and his Surety shall be liable for all costs and expenses incurred by the Owner in completing the Work, and also for the liquidated damages in conformity with the terms of the Contract. In case the sum of such liquidated damages and the expense so incurred by the Owner is less than the sum which would have been payable under the Contract if it had been completed by the Contractor or his Surety, the Contractor or his Surety shall be entitled to receive the difference; and in case the sum of such expense and such liquidated damages exceeds the sum which would have been payable under the Contract, the Contractor and his Surety shall be liable and shall pay to the Owner the amount of such excess. Notice to the Contractor shall be deemed to be served when delivered to the person in charge of any office used by the Contractor, his representative at or near the Work or by registered mail addressed to the Contractor at his last known place of business.

#### **8.12 TERMINATION FOR FAILURE OF PERFORMANCE:**

In the event of failure by the Contractor to perform any and all of the Contractor's obligations in a prompt and efficient manner satisfactory to the Owner, the Owner will have the right to summarily terminate this agreement, including all work covered hereby, by giving the Contractor written notice of such termination, after which the Owner may employ contracting services of his choice to complete the Work under this Contract and the Contractor and its Sureties will reimburse the Owner any additional costs which may result from such termination and employment of other contracting services. Failure by the Owner to exercise this right to so terminate this Contract for any such default by the Contractor shall not constitute a waiver by the Owner of its right to so terminate this Contract for any subsequent default.

### **8.13    PAYMENTS TO CONTRACTOR:**

The Contractor shall submit a payment estimate on or before the 1<sup>st</sup> day of each calendar month for work performed the preceding calendar month. Within ten (10) days of receipt of the estimate, the Engineer will review, approve, and forward the estimate to the Owner, or return the estimate to the Contractor for needed corrections. Upon receipt of an estimate which has been reviewed and approved by the Engineer, the Board will consider the estimate at its next scheduled meeting, and within ten (10) calendar days after Board approval, will make a partial payment to the Contractor on the basis of an approved and certified estimate. To ensure the proper performance of this Contract, the Owner will retain five (5%) percent of the amount of each estimate until fifty percent (50%) of the Contract amount is reached and no further retainage will be withheld (unless a different amount is stipulated in the Special Provisions) until final completion and acceptance of all Work covered by the Contract. All material and work covered by partial payments made shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the Owner to require the fulfillment of all of the terms of the Contract.

The Contractor agrees that he will indemnify and save the Owner harmless from all claims growing out of the lawful demands of subcontractors, laborers, workmen, mechanics, materialmen, and furnishes of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this Contract. The Contractor shall furnish satisfactory evidence that all obligations of the nature herein above designated have been paid, discharged, or waived. If the Contractor fails so to do, then the Owner may, after having served written notice on the said Contractor, either pay unpaid bills of which the Owner has written notice, direct, or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged, whereupon payment to the Contractor shall be resumed, in accordance with the terms of this Contract, but in no event shall the provisions of this sentence be construed to impose any obligations upon the Owner to either the Contractor or his Surety. In paying any unpaid bills of the Contractor, the Owner shall be deemed the agent of the Contractor, and any payment so made by the Owner shall be considered as a payment made under the Contract by the Owner to the Contractor and the Owner shall not be liable to the Contractor for any such payment made in good faith.

All material and work covered by partial payments made shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and Work upon which payments have been made or the restoration of any damaged Work, or as a waiver of the right of Owner to require the fulfillment of all the terms of the Contract.

### **8.14    PAYMENT FOR MATERIAL STORED:**



Material delivered to the Project site, but not incorporated in the completed work will be paid for (less retainage) in the month following delivery when substantiated by invoices from the manufacturer. This includes materials delivered to storage prior to issuance of Notice to Proceed. Invoices for materials delivered during the month shall be included with the estimate on which the materials are shown. On monthly estimates subsequent to the first estimate submitted that includes invoices for stored materials for which payment to the Contractor has been made, there shall be a signed statement that the invoices have been paid by the Contractor. The statement shall read as follows:

“This is to certify that payment has been made for invoiced materials included in  
Previous monthly estimates No. \_\_\_\_\_ through \_\_\_\_\_.

Signed \_\_\_\_\_”

In the event that such statement is not furnished or the manufacturer’s or material suppliers notify the Owner in writing that they have not been paid for materials included on previous estimates, the Owner will make payment to the manufacturers or material suppliers in accordance with the provisions of these Specifications and the amount of such payments shall be deducted from the amount then due the Contractor. It is the intent that payment for materials delivered to the Project are to be paid for as promptly as possible and that the Contractor is to make remittance for such materials to the manufacturers or materials suppliers promptly upon receipt of funds from the Owner. The Owner reserves the right to take such steps as deemed appropriate pursuant to the provisions of these Specifications to assure that materials are paid for promptly.

#### **8.15 PAYMENT BY CONTRACTOR:**

The Contractor shall pay: (a) for all transportation and utility services not later than the 20<sup>th</sup> day of the calendar month following that in which services are rendered; (b) for all materials, tools, and other expendable equipment to the extent of 90 percent of the cost thereof, not later than the 20<sup>th</sup> day of the calendar month following that in which such materials, tools, and equipment are delivered at the site of the Project; (c) for major items of equipment to be installed in the Work, not later than the 5<sup>th</sup> day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the equipment furnished; and (d) to each of his subcontractors, not later than the 5<sup>th</sup> day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors to the extent of each subcontractor’s interest therein.

#### **8.16 FURNISHING OF UTILITIES:**

The Contractor, at his own expense, shall provide water, sewer, gas, electricity and telephone lines for construction. The Contractor shall provide all necessary temporary piping and wiring as required to perform his work. After completion of the permanent utility connections, the Contractor shall be required as a part of this Work to secure all utility services from the respective utility companies and shall pay all monthly bills until final acceptance. The Contractor shall then have the respective utility

companies transfer their billing to the Owner's name. If the Owner obtains beneficial use prior to final acceptance, the billing may be transferred at that time. Utility services required for testing of equipment or other use of the Contractor will be paid for by the Contractor regardless of whether equipment has been placed in service. Unless specified elsewhere within these Specifications and/or noted on the Plans, costs associated with the providing of permanent utilities including water and electricity requiring work beyond the point of connection of the utility company will be considered outside the scope of work defined for this Contract. Costs, charges, fees, etc., assessed by utility companies for work or services beyond the point of connection shall not be the responsibility of the Contractor unless specifically included by other portions of these Specifications and Plans. Utility services required for testing of equipment will be paid for by the Contractor regardless of whether equipment has been placed in service.

**8.17 MONTHLY ESTIMATES:**

For the purpose of making partial monthly estimates only work that has been completed will be measured for payment. On each monthly estimate, the Contractor shall place the following certification:

"I hereby certify that the Work covered by this estimate was performed in accordance with the Contract, that prevailing scales of wages were paid and that this estimate is true and that payment therefore has not been received.

Number of Days in Contract	_____ Days
Number of Days Elapsed	_____ Days
Percent of Time Elapsed	_____ %
Percent of Contract Completed	_____ %

By \_\_\_\_\_"

**8.18 EXTRA AND FORCE ACCOUNT WORK:**

Extra Work as hereinbefore defined, when authorized and accepted will be paid for in accordance with the following:

- A. The Contractor shall submit to the Owner or its authorized representative a written agreement for the Work to be done and basis of payment (lump sum, force account or unit price), and submit the same to the Owner for authorization to perform such Extra Work.
  1. When Extra Work is authorized to be paid for on a lump sum basis, the Contractor shall compute the percentage done each month and submit with the monthly estimate, a detail sheet showing this percentage and the amount due.

2. When Extra Work is authorized to be paid for on a unit price basis, the Contractor shall include on each monthly estimate the amount of Work done that month.
3. When Extra Work is authorized to be paid for on a Force Account basis, the Contractor shall furnish itemized statements to the Engineer of the cost of all Force Account work, which shall include a certified copy of the weekly payroll and original receipted bills for all materials used and freight charges paid on same, provided that where materials used are not specifically purchased for use on Extra Work but are taken from the Contractor's stock, the Contractor shall submit an affidavit of the quantity, price, and freight on such materials in lieu of original bills and invoices, which affidavit must be approved by Engineer.

With each monthly estimate on Work paid for on a Force Account basis, the Contractor shall submit in duplicate a detailed statement showing the following:

- a. Name, class, date, number of hours worked each day, total hours, rate and extension for each laborer and foreman engaged.
- b. Designation, number of hours worked each day, total hours, rental rate and extension for each truck, and unit of machinery engaged.
- c. Quantity of materials, price and extension.
- d. Freight on materials.
- e. When the Extra Work is complete, the cost of Property Damages, Liability, Worker's Compensation and Unemployment Insurance.

B. All Extra Work done by Force Account will be paid for in the following manner:

1. For all labor, and foreman in direct charge of the specific work, the Contractor shall receive the current local rate of wage, to be agreed upon in writing before beginning work, for each and every hour that said labor, teams and foreman are actually engaged in such work; to which shall be added an amount equal to 10 percent thereof. No allowance shall be made for general superintendent and use of small tools and ordinary equipment.
2. For the cost of Property Damage, Liability, Worker's Compensation and Unemployment Insurance required for Force Account Work, the Contractor shall receive the actual cost to which no percentage shall be added. The Contractor shall furnish satisfactory evidence of the rate or rates paid for such insurance.

3. For materials, the Contractor shall receive the actual cost of such material delivered to the Work, including the freight charges, as shown by original receipted bills; to which shall be added an amount equal to 10 percent of the sum thereof.
4. For any machinery or special equipment other than small tools, including pertinent fuel and lubricants, which it may be deemed necessary or desirable to use, the Contractor shall be allowed a reasonable rental price to be agreed upon in writing before such work is begun, for the time that such equipment is in use on the Work and to which sum no percentage shall be added.

No Extra Work will be paid for unless unit prices or wages have been agreed upon in writing before such work is started.

The compensation as above provided in 1, 2, 3, and 4 shall be accepted by the Contractor as payment in full for Extra Work done on a Force Account basis including superintendence, general expense, overhead, use of tools and equipment for which no rental is allowed, Contract Bonds and profit.

**8.19 ACCEPTANCE OF FINAL PAYMENT CONSTITUTES RELEASE:**

The acceptance by the Contractor of final payment shall be and shall operate as a release to the Owner of all claims and all liability to the Contractor for all things done or furnished in connection with this Work and for every act and neglect of the Owner and other relating to or arising out of this Work. No payment, however, final or otherwise, shall operate to release the Contractor or his Sureties from any obligations under this Contract or the Contract Bonds.

**8.20 DISTURBED AREAS:**

All areas that are disturbed due to direct or indirect construction operations shall be restored by the Contractor to a condition equal or better than the condition of the area prior to the operations.

**END OF SECTION**

## SECTION 9

### TESTING MATERIALS

#### **9.01 INSPECTION AND TESTING OF MATERIALS:**

The following will be the minimum test requirements. All tests are to be performed by a recognized testing laboratory subject to the approval of the Owner.

Materials of construction, particularly those upon which strength and durability of the structure may depend, shall be inspected and tested to establish conformity with the Contract and suitability for uses intended. The following are differentiations of minimum service desired to protect the interest of the Owner. Other materials, not listed, shall also receive attention consistent with the importance of the use to which they are to be put.

The judgment of the Engineer shall prevail where it appears advisable to deviate from the limitations set forth hereinafter because of nonavailability of the material required other than concrete materials and concrete.

When so specified in the Special Provisions, the Owner will pay for testing; but when not specified, the testing shall be performed, at no cost to the Owner, by an approved independent testing laboratory.

#### **9.02 PORTLAND CEMENT:**

- A. Where the total Project requirement is less than 200 barrels (one car):
- Cement shall have been shipped from the mill not more than three months previous to receipt on the Work. Manufacturer's certificate required.
- B. Where the total Project is between 200 barrels and 800 barrels:
- Manufacturer's test and certificate of inspection conformance for each shipment shall be furnished except where, for special reasons, independent laboratory testing as for condition C is required.
- C. Where the total Project requirement exceeds 800 barrels; also where cement other than a

standard ASTM, or a Federal Specification Portland Cement, is used:

Tests shall be made on the entire cement requirement by an approved independent laboratory on car samples, or bin (sealed) samples, as may be required. (ASTM Specification C150)

Cement Testing shall be conducted under ASTM Specification C150 where not in conflict with Project Specifications.

#### **9.03 AGGREGATES FOR USE IN CEMENT CONCRETE:**

- A. Concrete aggregates shall conform to "Standard Specifications for Concrete Aggregates", ASTM Serial Designation C33.
- B. In the absence of test records indicating suitability, or of a satisfactory service record for a period of 5 or more years, the test requirements for fine and coarse aggregates shall be made.
- C. The maximum size of the aggregate shall not be larger than one-fifth of the narrowest dimension between forms of the member for which the concrete is to be used, nor larger than three-fourths of the minimum clear spacing between reinforcing bars.

#### **9.04 FINE AGGREGATE:**

Conformity with ASTM C33. Tests shall be made periodically as the Work progresses to assure uniformity.

#### **9.05 COARSE AGGREGATE:**

Conformity with ASTM C33.

#### **9.06 SLUMP TESTS OF CONCRETE:**

Where 25 or more cubic yards of concrete are placed, also as necessary to maintain desired consistency of the concrete, a slump test shall be made per ASTM C143. Not less than one such test shall be made for each 50 cubic yards of concrete placed at one

operation. Such test shall also be made on each sample of concrete used in making test specimens.

**9.07 ADVANCE CONCRETE TESTS:**

- A. Where more than 50 and less than 500 cubic yards of concrete are required:

Before the start of concreting, make a single batch of a set of four standard 6-inch cylinders per ASTM C31 and cure. Test two at 7 days and two at 28 days per ASTM C39. Report as for "Concrete Control Test (Laboratory Curing)" below.

- B. Where a total of more than 500 cubic yards of concrete is required:

Advance tests of concrete shall be made in an independent laboratory in accordance with ASTM C39. Six standard 6-inch compression cylinders, three to be tested at 7 days and three at 28 days, shall be made with the proportioning and materials, including cement, of the type, brand and mill source proposed to be used in the major part of the Project. The slump should not be less than the greatest slump expected to be used in the structure. The tests made on aggregates, as required above, may be made a part of these tests if suitably referenced on the reports which shall be issued at 7 and 28 days to interested parties. These tests shall be repeated if necessary because of changes in materials or unsatisfactory results. Strength requirements will be stated in the Contract.

**9.08 CONCRETE DESIGN MIX AND TESTS:**

- A. The Contractor shall submit to the Owner for approval a design concrete mix by an approved commercial testing laboratory before placing any concrete.
- B. All on-site concrete testing shall be at the Owner's expense.

**9.09 CONCRETE CONTROL TESTS (LABORATORY CURING):**

Where a total of more than 500 cubic yards of concrete is required:

During the progress of the Work, and for each different mix of concrete, a set of two standard 6-inch concrete cylinders shall be made and tested, where from 25 to 100 cubic yards of concrete are placed, during each and every day's operations. Also, an additional set of tests shall be made for each 100 cubic yards or major fractions thereof over and above the first 100 cubic yards. The cylinders of each set shall be molded from the same sample of concrete and tested at 7 days or at 28 days, as may be specifically desired. ASTM C31 shall govern. Testing shall be done per ASTM C39.

**9.10 REINFORCING STEEL:**

- A. Where less than 50 tons are required:

Field inspection for section, rust, shape and dimensions. Manufacturer's certificate required.

- B. Where 50 or more tons are required:

Inspection and tests by an approved laboratory for conformance with governing specification.

**9.11 STRUCTURAL STEEL:**

- A. Where less than 100 tons are required:

Field inspection for rust, dimensions, riveting, welding, painting, etc. Manufacturer's certificate required.

- B. Where 100 or more tons are required:

Mill and shop inspection by an independent laboratory.

**9.12 STEEL BAR JOISTS:**

Where more than 100 joists are required:

There shall be furnished the manufacturer's test data proving the efficiency of the design of his joists for the purpose intended, and in addition there shall be furnished certificates that the joists as furnished are in accordance with Project requirements and with the Standard Specifications for Steel Joists as given in the handbook "Steel Joists Construction" published by the Steel Joists Institute.

**9.13 BRICK:**

- A. Where less than 50,000 are required:

Visual inspection as set forth in ASTM or other designated specification.

- B. Where 50,000 or more are required:

Visual inspection and tests, as set forth in ASTM or other designated specification, by an independent laboratory.

**9.14 BUILDING BLOCK AND STONE:**

- A. Where less than 1,000 pieces are required:

Visual inspection as set forth in ASTM or other designated specification.

- B. Where 1,000 or more pieces are required:

Visual inspection and tests, as set forth in ASTM or other designated specification, by an independent laboratory.

**9.15 CONCRETE SEWER PIPE:**

Inspection and testing, as set forth in ASTM or other designated specification, by an independent laboratory. Inspection shall be made at the factory and each joint of approved pipe and fitting shall be stamped by the laboratory. Except when so specified in the Special Provisions, the supplier may use his own quality control program and provide and affidavit as to conformance with Contract requirements.

**9.16 CAST IRON, DUCTILE IRON PIPE AND SPECIAL CASTINGS:**

Each piece of pipe shall bear the manufacturer's serial number and shall be certified by the manufacturer to have met the requirements of the governing Standard Specifications. Also, each piece shall be visually inspected in the field for Specification conformance.

**9.17 OTHER MATERIALS AND EQUIPMENT:**

Materials other than the foregoing, including equipment, shall or course, also be suitably specified, and shall be inspected and tested to assure conformance with the Specifications and with manufacturer's certificates.

**END OF SECTION**





## SECTION 10

### SPECIAL PROVISIONS

#### **10.01 ALABAMA ACT NO. 84-228:**

Contractors shall comply with the requirement of Act No. 84-228 of the Legislature of the State of Alabama. Particular attention is directed to Section 2 of Act. No. 84-228 which requires submission of certain documents with the bid documentation and failure to submit such documents may be cause for rejection of the Contractor's bid.

As a convenience to bidders, the law is presented below; however, it shall be the Contractor's responsibility to satisfy himself as to the responsibilities under the law.

ALABAMA LAW  
(Regular Session, 1984)

Act No. 84-228

S. 135-Senators Foshee, and Teague

#### AN ACT

Relating to contracts and contractors; to give preference to resident contractors who bid on public work projects except where federal funds are involved.

Be it Enacted by the Legislature of Alabama:

**Section 1.** In the letting of public contracts in which any state, county or municipal funds are utilized, except those contracts funded in whole or in part with funds received from a federal agency, preference shall be given to resident contractors and a nonresident bidder domiciled in a state having laws granting preference to local contractors shall be awarded Alabama public contracts only on the same basis as the nonresident bidder's state awards contracts to Alabama contractors bidding under similar circumstances; and resident contractors in Alabama as defined in Section 39-2-12, Code of Alabama 1975, be they corporate, individuals or partnerships, are to be granted preference over nonresidents 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 nonresident.

**Section 2** Nonresident bidders must accompany any written bid documents with a written opinion of an attorney at law licensed to practice law in such nonresident bidder's 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.

**Section 3.** A summary of this law shall be made a part of the advertised Specifications of all projects affected by this law.

**Section 4.** The provisions of this Act are severable. If any part of this Act is declared invalid or unconstitutional, such declaration shall not affect the part which remains.

**Section 5.** All laws or parts of laws which conflict with this Act are hereby repealed.

**Section 6.** This Act shall become effective immediately upon its passage and approval by the Governor, or upon its otherwise becoming law.

Approved April 30, 1984 Time: 4:30 P.M.

**10.02 SMALL AND SMALL UNDERUTILIZED BUSINESSES:**

The Board's Small and Underutilized Business office will assist Bidders upon request in meeting the requirements of the Contract.

**10.03 STATE HIGHWAY OR RAILROAD PERMITS:**

Where a pipe is to be laid along or under a State Highway or railroad, the Contractor shall furnish the Highway Department or railroad company with bonds and insurance as required to secure a permit. The cost of bonds and insurance will be borne by the Contractor.

**10.04 PERMITS, CERTIFICATES, LAWS AND ORDINANCES:**

The Contractor shall, at his own expense, procure all permits, certificates and licenses required of him by law for the execution of his work. He shall comply with all federal, state, and local laws, ordinances and rules and regulations relating to the performance of the Work.

The Contractor shall also comply with Ordinance 55-012 "An Ordinance Regulating All Excavation Work of Existing Streets and Improvements Within Public Rights-of-Ways," adopted by the Board of Water and Sewer Commissioners of the City of Mobile, Alabama, April 3, 1970.

**10.05 WAGE RATES:**

The construction of said Project shall in all respects conform to all applicable requirements of federal, state and local laws and ordinances.

**10.06 SEQUENCE OF OPERATIONS:**

The Contractor shall start at the point or points designated by the Owner and shall proceed with the sequence of construction as the Owner directs. The Contractor shall provide sufficient crews to lay pipe and complete the job within the time specified. In general, each line shall be laid, tested and placed in service before another line is started.

**10.07 PROJECT DOCUMENTATION:**

- A. **General:** Prior to start of construction, the project right-of-way or easement shall be documented by the use of photographs or videotapes. Pictures (photo or video), in color, shall be taken at 100 feet on centers and shall be taken along the centerline of the Project looking up station. At least one station marker shall be visible for identification purposes and station markers shall be set up by the Contractor. During the course of documentation, any features or items of interest or importance which may be encountered shall be photographed or videotaped. Prints or tapes shall be delivered to the Engineer within one week after they are made.
- B. **Photographs:** Clear, legible photographs shall be taken by a skilled technician using a wide angle lens. Each photograph shall be identified on the back with Project number, location, date and time of day that photograph was taken. One color print approximately 4" x 6" and the negative shall be delivered to the Engineer.
- C. **Videotapes:** The purpose of the videotape recordings shall be a supply of continuous visual and audio record of problem areas, items, and features found within any particular area. This videotape record may be supplemented with photographs to exactly identify and locate specific bad features or items.

The videotape recordings shall be capable of recording and reproducing a picture having not less than 500 lines of resolution. The videotape recorder shall be one on which both sound and video information can be recorded utilizing a VHS video cassette system. The videotape recording shall be made on magnetic tape which shall produce a visual image equal to or better than the quality of the picture on a television monitor. The replay of the recorder video information, when reviewed on a monitor/receiver, shall be free of electrical interference and shall produce clear, stable images. To ascertain that the equipment to be used in this Work meets the stated minimum requirements, a videotape of a suitable test pattern will be required prior to initiation of Work.

The audio portion of the composite signal shall be sufficiently free of electrical interference and background noise to provide an oral report that is clear and completely and easily discernible. The audio portion of the tape report shall be recorded by the operating technician on the audio-video tapes as they are being produced and shall include the location or identification of the section being viewed, the station-to-station direction of travel, the distance traveled on the specific run, and any problems encountered.

Videotape recordings shall be enclosed in a vinyl plastic container which shall clearly indicate the date the tape was taken and the designated section(s) of the Project contained on the tape.

There shall be no separate payment for photographic and/or videotape work.

#### **10.08 REPORTS, RECORDS AND DATE:**

The Contractor and each of his subcontractors shall submit to the Owner such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records, and other data as the Owner may request concerning work performed or to be performed under this Contract.

#### **10.09 SIGNS:**

Before starting and during construction on any Project, the Contractor shall place at both ends of the section signs approximately 8 feet long by 4 feet high. The signs shall be worded approximately as shown in Appendix F.

#### **10.10 CONSTRUCTION WITHIN STATE HIGHWAY RIGHT-OF-WAY:**

The requirements of the State of Alabama Highway Department "Standards for Accommodating Utilities on Highway Rights-of-Way" are hereby made a part of these Specifications for all utility construction within rights-of-way for roads or highways under the jurisdiction of the State of Alabama Highway Department.

#### **10.11 CUTTING OF TREES WITHIN PUBLIC RIGHTS-OF-WAY:**

The Contractor shall obtain a permit from the Mobile Tree Commission prior to trimming or removing any trees located within public rights-of-way. When large tree limbs and roots are encountered, the Contractor shall take precautions to protect by tunneling, or pushing the pipe under the roots so as not to damage them. No additional payment shall be made for this Work, but it shall be included in the unit price bid for related items.

#### **10.12 DEWATERING:**

The Contractor shall remove any water which may be found or may accumulate in the trenches and shall perform all work necessary to keep them clear of water while the foundations are being laid, the masonry being constructed, or pipe laying is in progress. Such removal shall be accomplished by means of a well point system or other approved means. Comprehensive plans for dewatering operations, if used, shall be submitted prior to installation. No extra payment will be made for dewatering.

#### **10.13 WEATHER CONDITIONS:**

In the event of temporary suspension of work or during inclement weather, or whenever the Owner shall direct, the Contractor will, and will cause his subcontractor to protect carefully his and their Work and materials against damage or injury from weather. If any work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any of his subcontractors to protect his work, such materials shall be removed and replaced at the expense of the Contractor.

#### **10.14 LOCKS AND KEYS:**

All locks to be furnished under this Contract shall be keyed alike and 5 keys shall be delivered to the Engineer for distribution to the Owner. Padlocks shall be furnished by the Owner except where noted otherwise on the Plans and in these Specifications.

#### **10.15 TIGHTNESS OF WATER CONTAINING WALLS:**

All basins and tanks are hydraulic structures and shall be watertight. Each tank shall be filled with water to full depth and kept full 24 hours for observation. The Contractor shall exercise every precaution to secure watertightness by careful mixing and placing of the concrete so as to obtain a homogeneous mixture at maximum density, without air pockets or voids, using the minimum practical amount of water in the mix. Extreme care shall be used to secure continuity of water stops at expansion and construction joints, sealing off holes from wall ties, etc., and thoroughly placing concrete about wall sleeves, wall pipes and other obstructions. The Contractor shall fix all leaks. The Contractor shall furnish test water at his own expense.

#### **10.16 EXTENSION OF CONTRACT TIME:**

Unless specifically waived by the Owner, when an extension of contract time is granted by the Owner to the Contractor to complete the Work under this Contract, the Contractor shall pay any additional engineering Cost or other Cost accrued to the Owner as a result of the extension of time granted.

The requirements of Specification Paragraph 5.14, Paragraph 5.15 and Paragraph 8.10 will be strictly adhered to upon completion of the Work.

**10.17 CLEAN-UP:**

The job shall be kept clean at all times. Loose dirt shall not be allowed to clog ditches or cover sidewalks. Soft clay or other undesirable material removed from the trenches shall be removed from the streets, sidewalks or ditches. The Owner reserves the right to demand that the Contractor's forces be diverted to this clean-up at any time that condition of streets, driveways, sidewalks, or private property warrants such diversion. Such diversion of Contractor's forces will not entitle the Contractor to any extension of time or additional compensation.

**10.18 BRANDS OF EQUIPMENT AND MATERIALS:**

When referenced the name of a certain brand, make or manufacturer is to denote the quality standard of the equipment or material, and is to convey the general style, type, character and quality. Whenever a material or article required is specified or shown on the Plans by using the proprietary product or of a particular manufacturer or vendor, any material or article which will meet the design criteria and is equal in function and durability as determined by the Engineer will be considered.

**10.19 AFFIDAVIT OF COMPLIANCE:**

Suppliers of pipe and fittings shall furnish in triplicate to the Owner, and affidavit stating that all pipe and fittings furnished under this Contract conform to the requirements as set forth in these Specifications. Unless specified otherwise, all materials shall be new, unused and without defect.

**10.20 SUPERVISION OF INSTALLATION AND THE GUARANTEE:**

The Contractor shall employ a factory trained engineer to supervise the installation and alignment of all items of mechanical and electrical equipment. He shall see that all items of equipment are installed, piped, and wired, meeting the requirements of the Plans and Specifications and in accordance with the manufacturer's recommendations. The Contractor shall place all equipment in satisfactory operation and demonstrate such. The Contractor shall guarantee the satisfactory operation of all apparatus and machinery against defects in workmanship, material, and installation for a period of one year from the date of final acceptance. The Owner will give notice of observed defects with reasonable promptness and the Contractor shall remedy any defects in the Work and pay for any damage to other work resulting therefrom. Neither the final certificate of payment nor any provision in the Contract Documents nor partial or entire use or occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with the Contract Documents, or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.

The manufacturer's representatives shall submit to the Engineer in writing a document stating the Contractor has installed the equipment properly and in accordance with the manufacturer's recommendations.

**10.21 MANUFACTURER'S CERTIFICATION:**

To assure that manufacturers and suppliers are aware of the use to which their equipment and products will be subjected, the Contractor shall require the manufacturer or manufacturer's representative to place the following certification on submittal data transmittals:

"This is to certify that we have examined the Plans and Specifications for this Project and have ascertained that this equipment or material is suitable for the Purpose and use intended.

\_\_\_\_\_  
Authorized Signature

**10.22 MAXIMUM TRENCH WIDTH:**

The maximum trench widths set the limit of payment for various items listed in Paragraph 10.26, "Basis of Payment and Method of Measure." The maximum trench widths and typical paving cut-backs which are applicable to these Specifications are shown in Appendix I.

**10.23 BASIS OF PAYMENT AND METHOD OF MEASURE:**

- A. **General:** The unit price bid for the various items shall be compensation in full for furnishing all materials, labor, equipment, and incidentals for the item in place complete in every detail. There will be no direct payment for clearing, excavating, bracing, caulking, backfilling, clean-up, restoration of property, testing or other items of work necessary for the installation of the item, with the exception of the removal and replacement of pavement as paid for under a separate item.
- B. **Item Number Clarification:** Bid items are numbered according to the following classifications: Sanitary Sewer Items (SS); Water Line Items (WL); Backfilling Items (BF); Pavement Items (PA); General Construction Items (GC); and Erosion Control Items (EC).

**SS-1. Stacks and Laterals:** The unit price bid for this item will be compensation in full for

furnishing and installing 1 linear foot of the various types and sizes of pipe used for stacks and laterals complete in place with plug or cap for each stack or lateral. Any bends required for alignment of laterals will be paid for under this item on the linear foot basis. Where stacks or laterals are to serve property that is lower than the street, the stacks and laterals shall be placed at such depth as required to serve such property and no additional payment will be made for extra depth required for stacks and laterals.

**SS-2. Sewer Pipe:** The unit price bid for the various sizes, types and depths of sewer pipe shall be compensation in full for 1 linear foot of pipe complete in place, the measurement being made parallel to and along the centerline of the installed pipe. Where pipe starts and terminates in manholes, the measurements will be from center to center of manholes. Where pipe starts or terminates without manholes, the measurement will be made from end of pipe to center of next manhole. No deduction in length will be made for space in the line occupied by manholes or fittings. The depth of cut to be paid for will be the vertical distance from the ground surfaces on the centerline of pipe to the pipe invert. Elevated pipelines shall be paid for at the unit price for 1 linear foot of the various size and type of elevated pipe. Retained joints in elevated gravity sewers shall be included in price bid per linear foot of elevated sewer pipe. Pipe in encasement or culverts shall be paid for at 0'-6' depth.

**SS-3. Wyes and Tees for Sewers:** The unit price bid shall be compensation in full for furnishing and installing 1 wye or tee complete in place, including covers or plugs if required.

**SS-4. Manholes:** The unit price shall be compensation in full for 1 lined manhole of the various sizes, types, and depths complete in place. The depth of manhole shall be established as the vertical distance from the surface of ground on centerline to the lowest pipe invert. Where the manhole protrudes above the surface of the ground, the depth shall be established as the vertical distance from the top of manhole cover to the lowest pipe invert. The unit price shall include the joints of pipe and plugs used as stubouts, where shown on the Plans.

**SS-5. Drop Connections at Manholes:** Payment for this item will be made on the basis of the unit price per linear foot; the measurement will be made between the invert of the incoming sewer and the invert of the manhole. The unit price bid shall be for 1 linear foot of drop connection complete in place including sewer pipe and fittings of the proper size, extension of the concrete manhole base, the concrete or masonry encasement and all incidentals. This payment is to be in addition to the payment for the standard manhole.

**SS-6. Force Main:** The unit price bid for the various sizes, classes, and types of pipe will be compensation in full for furnishing all labor, material, equipment, and incidentals (including locked mechanical joint retainer glands when set forth in the Proposal) necessary to lay and complete 1 linear foot of the pipe regardless of depth of cover in accordance with these



Specifications. Measurement for payment will be made along the centerline of installed pipe, such measurement starting at the centerline of installed pipe and terminating at the centerline of junctions or to the various ends. There will be no deductions in measured length for specials, fittings, or valves installed in the line.

**SS-7. Sewage Pumping Station:** The lump sum bid shall be compensation in full for 1 sewage pumping station complete within the limits shown on the Plans including, but not limited to structures, piping, grading, topsoil, grassing, fencing, electrical work, pumps, motors and starters, and incidentals necessary for a complete installation.

**SS-8. Abandon Existing Manhole:** The unit price bid for this item shall be compensation in full for breaking and filling 1 abandoned sewer manhole complete in accordance with the Plans. The unit price shall include furnishing, placing, and compacting sand or sand-clay backfill to the original grade. There will be no additional payment made for sand or sand-clay backfill material used under this item. Existing manholes to be abandoned shall be broken off to a depth of 3 feet below the ground line. Removing and cleaning the manhole frame and cover, and transporting frame and cover to the Owner's warehouse will be paid for separately.

**SS-9. Concrete Plug for Sewer Pipe:** The unit price bid for this item shall be compensation in full for all labor, material, equipment, and incidentals necessary for 1 concrete or masonry plug of the various sizes used to plug an abandoned sewer pipe.

**SS-10. Concrete for Sewer Construction:** The unit price bid shall be compensation in full for 1 cubic yard of concrete for pipe cradles, foundations, thrust blocks, or encasement for pipe. Concrete used for manhole bottoms, concrete manholes, and for repaving will not be paid for under this item. (No payment will be made for this item where the Contractor elects to use it for his own convenience or to fill overcuts).

**SS-11. Ductile Iron or Cast Iron Fittings for Sewers/Force Mains:** The unit price bid for fittings for sewers or force main items will be compensation in full for furnishing and installing 1 pound of ductile iron or cast iron fittings complete in place (including locked mechanical joint retainer glands when set forth in the Proposal). Payment will be based on catalog weight of the manufacturer supplying fittings. Bolts and other miscellaneous items will not be included in the weights.

**SS-12. Running Board:** The unit price bid for this item shall be compensation in full for furnishing and laying 1 linear foot of the assembled running board including splices, battens, and wedges complete in place.

**SS-13. Saddle Piles:** The unit price bid for this item shall be compensation in full for furnishing and driving 1 linear foot of pile to grade, ready for receiving the running board.

**SS-14. Haunching for PVC Sewer Pipe:** The unit price bid for this item shall be compensation in full for 1 linear foot of haunching complete in place, measured along the centerline of the installed pipe.

**SS-15. Air and Vacuum Valve Assembly:** The unit price bid for this item shall be compensation in full for furnishing and installing 1 air and vacuum valve assembly complete in place, including the air and vacuum valve, valve back flush system, tapping saddle or tee, washed gravel, concrete pipe type valve pit, cast iron manhole type cover, fittings, connecting valving and piping, and all excavations, compaction, backfilling and clean-up, and incidentals necessary for a complete installation.

**SS-16. Internal Video Inspection:** The unit price bid for this item shall be compensation in full for furnishing all labor, equipment, materials, and incidentals necessary to complete 1 linear foot of television inspection of the new various size sewers for the purpose of documenting lateral locations.

**WL-1. Water Pipe:** The unit price bid for the various sizes and types of pipe will be compensation in full for furnishing all material, labor, equipment, and incidentals (including locked mechanical joint retainer glands when set forth in the Proposal) necessary to lay and complete 1 linear foot of pipe, in accordance with these Specifications. Measurement for payment will be made along the centerline of installed pipe, such measurement starting at the centerline of installed pipe and terminating at the centerline of junctions or to the various ends. There will be no deductions in measured length for specials, fittings, or valves installed in the line.

**SWL-2. Ductile Iron or Cast Iron Water Fittings:** The unit price bid for this item will be compensation in full for furnishing all material, labor, equipment, and incidentals (including locked mechanical joint retainer glands when set forth in the Proposal) necessary to install and complete 1 pound of ductile iron or cast iron fittings in accordance with these Specifications. All fittings including sleeves, reducers, etc., will be included under this item. Bolts and other miscellaneous items will not be included in the weights. Payment will be based on catalog weight of the manufacturer supplying fittings.

**WL-3. Gate Valves:** The unit price bid for the various size and type gate valves will be compensation in full for furnishing all material, labor, equipment, valve box, and incidentals necessary to install and complete 1 gate valve in accordance with the Plans and Specifications.

**WL-4. Butterfly Valves:** The unit price bid shall be compensation in full for furnishing and installing 1 butterfly valve of the various sizes complete in every respect including valve, operator, valve box, and incidentals necessary for a complete installation.

**WL-5. Tapping Valves and Sleeves:** The unit price bid for the various size tapping valves will be compensation in full for 1 tapping valve and sleeve with valve box complete in place in accordance with these Specifications.

**WL-6. Air Release Valve Assembly:** The unit price bid for this item shall be compensation in full for furnishing and installing 1 air release valve assembly complete in place, including the air release valve, tapping saddle or tee, washed gavel, concrete pipe type valve pit, cast iron manhole type cover, fittings, connecting valving and piping, and all excavation, compaction, backfilling and clean-up, and incidentals necessary for a complete installation.

**WL-7. Valve Stem Extensions:** The unit price bid for the various size valve stem extensions will be compensation in full for furnishing all material, labor, equipment, and incidentals necessary to install and complete 1 linear foot of valve stem extension in accordance with Plans and Specifications.

**WL-8. Fire Hydrants:** The unit price bid for fire hydrants will be compensation in full for furnishing all material, labor, equipment, and incidentals necessary to install and complete 1 fire hydrant in accordance with these Specifications. Depth of bury shall be 3'6" except where shown otherwise on the Plans or in the Proposal.

**WL-9. Fire Hydrant Extension Section:** The unit price bid for this item will be compensation in full for furnishing all material, labor, equipment, and incidentals necessary to install one, 1-foot long fire hydrant extension section complete with bolts, gaskets, and stem extension.

**WL-10. Hydrant Valve Anchoring Tee:** The unit price bid for hydrant valve anchoring tees will be compensation in full for furnishing all material, labor, equipment, and incidentals necessary to install and complete 1 hydrant valve anchoring tee of the various sizes in place.

**W-11. Concrete for Water Lines:** The unit price bid shall be compensation in full for 1 cubic yard of concrete used for foundations, anchors thrust blocks, or encasement for pipe. Concrete used for repaving will not be paid for under this item.

**W-12. Salvage Existing D.I. or C.I. Water Pipe:** The unit price bid for this item will be compensation in full for furnishing all labor, equipment, and incidentals necessary to remove, clean properly for reuse, and to transport salvaged water piping to a place of storage in the City of Mobile, Alabama to be designated by the Board, 1 linear foot of the various size pipe. Pipe damaged through carelessness of the Contractor will not be paid for. Measurement will be made along the centerline of the pipe. No deduction in length will be made for valves or fittings and the removing of these items shall be included in the unit price bid for salvage of existing pipe. Contractor shall place an identifying mark on each piece of pipe with blue paint, "W" for water pipe.

**W-13. Lowering Existing Water Line:** The unit price bid for this item will be compensation in full for furnishing all labor, equipment, and incidentals necessary to lower 1 linear foot of existing water lines (all sizes) at locations shown on the Plans or as designated by the Engineer, and to a depth that will afford ample clearance below proposed street or road construction and proposed drainage structures. Pipe damaged through carelessness of the Contractor will be replaced with new water pipe by the Contractor, at his expense. Measurement will be made along the centerline of the pipe. No deduction in length will be made for valves or fittings and the lowering of these items shall be included in the unit price bid for lowering existing water line. No extra compensation will be allowed for necessary adjustment of fire hydrants attached to existing water lines to be lowered.

**W-14. Remove and Salvage Existing Water Meters and Boxes:** The unit price bid for this item will be compensation in full for furnishing all labor, equipment, and incidentals necessary to remove, clean, haul, and store 1 water meter and meter box from existing water lines to be abandoned or where water service is to be discontinued. Meters and meter boxes damaged through carelessness of the Contractor will not be paid for. The price bid for this item shall include transporting the salvaged items to a place of storage in the City of Mobile, Alabama to be designated by the Owner.

**WL-15. Remove and Relocate Water Meter and Meter Box:** The unit price bid for this item will be compensation in full for removing, transporting, and re-installing 1 existing water meter and meter box complete and ready for use in the new location as designated on the Plans or as directed in the field.

**WL-16. Remove and Relocate Fire Hydrant:** The unit price for this item will be compensation in full for removing, cleaning, transporting, and reinstalling 1 existing fire hydrant complete and ready for operation in the new location as designated on the Plans or as instructed in the field. The price shall also include repainting of the hydrant in accordance with these Specifications.

**WL-17. Corporation Stops:** The unit price bid for the various size corporation stops will be compensation in full for furnishing corporation stops, tapping water lines, installing, and completing in accordance with these Specifications. Stops shall be installed where specified. Corporation stops used for bleeding air and testing purposes will not be paid for.

**WL-18. Curb Stops:** The unit price bid for various size curb stops will be compensation in full for furnishing curb stops, installed and completed in accordance with these Specifications. Stops shall be installed where specified or instructed in the field.

**WL-19. Copper Service Pipe:** The unit price bid for furnishing and laying the various sizes of service pipe will be compensation in full for furnishing all materials, labor, equipment and incidentals necessary to lay and complete 1 linear foot of pipe in accordance with these specifications. Measurement will be made along the center line of installed pipe, such measurement starting at the center line of installed pipe and terminating at the center line of junctions or to the various ends. There will be no deductions in measured lengths for specials, fittings, or valves installed in the line. Adapters necessary to properly join the copper service pipe to corporation stops and curb stops shall be considered incidental to the unit price bid for this work and no separate payment shall be made for such.

**BF-1. Sand or Sand-Clay Backfill:** The unit price bid for this item will be compensation in full for 1 cubic yard of sand or sand-clay used for backfill, which shall include furnishing sand or sand-clay, backfilling, compacting, and hauling away surplus material.

This item will be measured in place. The length authorized by the Engineer to be backfilled with sand or sand-clay, multiplied by the trench width for specified pipe diameter in accordance with Appendix I of these Specifications, multiplied by the average depth of backfill to the top of pipe and then converted to cubic yards, will be the amount paid for, regardless of the width or length removed, and replaced with sand or sand-clay.

**BF-2. Flowable Backfill:** The unit price for this item shall be compensation in full for furnishing and spreading 1 cubic yard of flowable backfill complete in place.

**PA-1. Removing and Preparation of Base for Flexible Pavement:** The unit price bid for this item shall be compensation in full for removing 1 square yard of flexible wearing surface and base and the preparation and placement of new base complete in place. In measuring this item for payment, the length removed multiplied by the specified trench width plus 18 inches will be the amount paid for, regardless of the width removed and replaced. No additional allowances will be made for bell holes or manhole.

**PA-2. Bituminous Wearing Surface for Patch Surfacing:** The unit price for this item shall be compensation in full for 1 square yard of bituminous concrete wearing surface placed at the rate of 1-1/4 inch square yard (or 1-1/2 inches in state and Mobile County right-of-way), including leveling, tack coat, pavement markings, and incidentals necessary for completion of the wearing surface.

**PA-3. Bituminous Wearing Surface for Full Width Street Surfacing:** The unit price bid for this item shall be compensation in full for 1 square yard of bituminous concrete wearing surface placed at the rate of 1-1/4 inch per square yard, including leveling, tack coat, pavement markings, and incidentals necessary for completion of the wearing surface.

**PA-4. Removing and Replacing Concrete Pavement:** The unit price bid for this item shall be compensation in full for removing and replacing 1 square yard of concrete pavement with Portland Cement Concrete Pavement complete in place including base course, saw cuts, pavement markings, and incidentals necessary for a complete installation of the concrete patch. In measuring this item for payment, the length removed multiplied by the width of pavement between saw cuts actually removed will be the amount paid for.

**PA-5. Temporary Asphalt Patch:** The unit price bid shall be compensation in full for 1 square yard of temporary asphalt patch complete in place including maintenance and removal prior to final concrete patch.

**PA-6. Replacement of Concrete Sidewalks or Ditch Paving:** The unit price bid for this item will be compensation in full for furnishing all material, labor, equipment, and incidentals to remove and replace 1 square yard of sidewalk under which pipe is laid. In measuring this item for payment the length removed multiplied by the trench width for the specific pipe diameter in accordance with Appendix I of this Specification will be the amount paid for, where the line crosses sidewalks regardless of the width removed and replaced. If the pipeline is laid under and parallel with the sidewalk, the actual width of the sidewalk, up to a maximum of 5 feet, will be measured for payment.

**GC-1. Reef Shell Foundation:** The unit price bid for this item shall be compensation in full for furnishing, spreading, and compacting reef shell over the full width of trench to an 8 inch thickness for 1 linear foot of trench. (No payments will be made for this item where the Contractor elects to use it for his own convenience or to fill overcuts). At the Contractor's option, crushed stone, or slag may be used for foundation material in lieu of reef shell at no change in Contract Price. Gravel, crushed stone, slag, and reef shell are specified in other sections of the Specifications.

**GC-2. Crushed Slag or Crushed Stone Foundation:** The unit price bid for this item shall be compensation in full for furnishing, spreading, and compacting crushed slag, or crushed stone over the full width of trench to an 8 inch thickness for 1 linear foot of trench. (No payments will be made for this item where the Contractor elects to use it for his own convenience or to fill overcuts).

**GC-3. Mats:** The unit price bid for this item shall be compensation in full for furnishing and installing mats in lieu of foundation material for piping. Compensation shall be for the full width of the trench and for 1 linear foot of trench.

**GC-4. Restrained Joint Fitting:** The unit price bid shall be compensation in full for 1 positive or friction restrained joint fitting of the various sizes complete in place including tee head bolts, set screws, and gasket.

**GC-5. Rust Proof Rods for Anchorage:** The unit price bid for this item will be compensation in full for furnishing all material, labor, equipment, and incidentals necessary to install and complete 1 linear foot of anchor rod. The price shall include threading, bolts, and coating of the rod.

**GC-6. Rust Proof Clamps for Anchorage:** The unit price bid for this item will be compensation in full for furnishing all material, labor, equipment, and incidentals necessary to install and complete 1 clamp. The price shall include all bolts, nuts, and coating of the clamps.

**GC-7. Anchoring Couplings:** The unit price bid shall be compensation in full for each anchoring coupling of the various sizes complete in place.

**GC-8. Encasement Pipe:** The unit price bid for furnishing and installing encasement pipe (corrugated metal, welded steel or tunnel liner plate) will be compensation in full for furnishing all material, labor, equipment, and incidentals necessary to install and complete 1 linear foot of the encasement pipe of various sizes and types in accordance with the Plans and Specifications including sand fill. Measurement will be made along the centerline of the installed encasement pipe. The carrier pipe inside encasement pipe will not be included in the unit price bid for encasement pipe.

**GC-9. Concrete for Piers and Headwalls:** The unit price bid for this item will be compensation in full for 1 cubic yard of formed concrete used for headwalls, elevated piers, or other types of formed concrete. The unit price bid shall include reinforcing steel, pipe straps, and anchor bolts. Measurements will be made of the complete structures.

**GC-10. Remove and Replace Concrete Curb and Gutter:** The unit price bid for this item shall be compensation in full for furnishing all equipment, labor, materials, transportation, handling, delivery and all incidentals necessary for removing and replacing 1 linear foot on concrete curb and gutter, concrete valley gutter or concrete curb, under which pipe is laid. Curb, gutter, and curb and gutter replaced shall be of the same type and thickness as that removed, with concrete, 3,000 psi minimum strength. The Contractor at his option may elect to bore or push piping liner under the existing concrete curb in lieu of removing and replacing concrete curb. If the Contractor elects to use this method, payment shall be the unit price bid to remove and replace concrete curb and gutter at the allowable trench widths.

**GC-11. Restoration of Property:** The lump sum bid shall be compensation in full for restoration of property within the various limits complete including, but not limited to replacement of sod in lawns and other sodded areas, replacement of ornamental shrubbery, clean-up, replacement of lawn decoration items and all other items of work required for restoration of property, except for removal and replacement of pavement and removal and resetting of fencing which will be paid for separately.

**GC-12. Remove and Reset Fencing:** The unit price bid shall be compensation in full for removing and resetting 1 linear foot of fence of the various types encountered. Measurement will be made for the length authorized to be removed and reset. Posts, fencing or other materials lost, damaged, or destroyed by the Contractor's operations shall be replaced with new material of the same type that existed prior to removal at the Contractor's expense. Fences that are removed and authorized by the Owner not to be reset will not be paid for.

**GC-13. Treated Timber Bracing:** The unit price bid shall be compensation in full for 1 board foot complete in place including all timber, bolts, washers, nuts, and incidentals necessary for a complete installation.

**GC-14. Caps for Pile Bents:** The unit price bid shall be compensation in full for 1 cap for pile bents complete in place including concrete, reinforcing steel, anchor bolts, sleeve nuts, anchor straps or cables, and coating of pipe anchorage.

**GC-15. Reinforcing Steel:** The unit price bid shall be compensation in full for 1 pound of reinforcing steel complete in place. Measurement of reinforcement will be made of the length of bars actually placed in accordance with the Plans or bar schedules approved by the Engineer, or in accordance with the instructions of the Engineer. The measured length will be converted to weights for the size of bars listed by use of the unit weights per linear foot stated in Federal Specification QQ-B-71a. Steel in laps indicated on the Plans or required by the Engineer will be paid for at the Contract Unit Price. No payment will be made for the additional steel in laps which are authorized for the convenience of the Contractor or for reinforcing steel in pile caps.



**GC-16. Polyethylene Sheath:** Where indicated on the Plans or where directed, the exterior of ductile iron pipe shall be covered with a sealed polyethylene sheath in accordance with AWWA Specification C105. The unit price for the various sizes of this item shall be compensation in full for furnishing and installing 1 linear foot of sheath complete in place.

**EC-1. Grassing for Erosion Control:** The unit price bid shall be compensation in full for 1 acre of grassing for erosion control complete in place including ground preparation, fertilizing, seeding, and maintenance. Measurement will be made to the nearest tenth of an acre of the area actually grassed except that grassing areas outside of the construction easements will be considered the responsibility of the Contractor and will not be measured for payment.

**EC-2. Mulching:** The unit price bid shall be compensation in full for 1 acre of mulching complete in place. Measurement will be made to the nearest tenth of an acre of the area actually mulched except that mulching of areas outside of the construction easements will be considered the responsibility of the Contractor and will not be measured for payment.

**EC-3. Solid Sod:** The unit price bid for this item shall be compensation in full for 1 square yard of solid sod where specified.

**EC-4. Riprap:** The unit price shall be compensation in full for 1 square yard, 1 foot in thickness, of riprap complete in place. Price shall include shell or gravel used for choking riprap. Where depths greater than 1 foot are shown on the Plans or directed the quantity to be paid for will be increased in the proportions that the thickness bears to 1 foot, i.e., if thickness is 1.5 feet then the surface area will be multiplied by 1.5 to determine the quantity to be paid for.

**EC-5. Gravel Blanket for Riprap:** The unit price bid shall be compensation in full for 1 square yard, 6 inches in thickness, of gravel blanket for riprap complete in place.

**EC-6. Shell Blanket for Riprap:** The unit price bid shall be compensation in full for 1 square yard, 6 inches in thickness, of shell blanket for riprap complete in place.

**EC-7. Timber Ditch Checks:** The unit price for this item shall be compensation in full for 1 timber ditch check as detailed, complete in place.

**EC-8. Erosion Control Netting:** The unit price bid for this item will be compensation in full for furnishing and installing 1 square yard of erosion control netting, including all materials, equipment, tools, labor, and incidentals required to complete the item. Payment will be limited to a 20 foot total width.

**EC-9. Silt Fence:** The unit price bid for this item shall be compensation in full for all labor, material, equipment, and incidentals necessary for 1 linear foot of silt fence installed for temporary erosion control.

**EC-10. Hay Bales:** The unit price bid for this item shall be compensation in full for all labor, material, equipment, and incidentals necessary for 1 hay bale installed for temporary erosion control.

**EC-11. Geotextile Filter Blanket for Riprap:** The unit price bid for this item shall be compensation in full for all labor, materials, equipment, and incidentals necessary for the installation of 1 square yard of geotextile filter blanket, complete in place.

#### **10.24 SPECIAL HANDLING OF PURCHASE ORDERS<sup>1</sup>**

The Board of Water and Sewer Commissioners is exempt from City, County, State and Federal sales tax for any hardware, equipment, and materials purchased for the installation of Capital projects. Contractors shall take this into consideration when preparing bids for capital projects. To ensure there are no taxes charged, Contractors are directed to do the following:

Contractor shall contact the Alabama Revenue Department and apply for a tax exempt certificate for the specific project. The phone number for the Mobile office is 334-344-4737. The web site that explains the rules and regulations for tax exemption is [www.ador.state.al.us](http://www.ador.state.al.us), rule number 810-6-5.02.

Contractor shall mail copies of the tax exempt certificate to all suppliers of all hardware, equipment, and material.

Contractor shall state on each purchase order to the supplier that material, equipment, and hardware for installation owned and operated by the Board of Water and Sewer Commissioners of the City of Mobile are exempt from County and State sales tax as per the number on the certificate of exemption.

#### **10.25 BYPASS PUMPING<sup>2</sup>**

The Contractor shall submit three (3) copies of a Bypass Pumping Plan as required in Section 12.22 to the Engineer for review prior to proceeding with bypassing operations. Bypassing operations shall not commence until a Bypass Pumping Plan is reviewed by the Engineer.

The Contractor shall be responsible for and shall indemnify and hold the Owner harmless for any sanitary sewer overflow occurring as the result of the work performed. The Contractor is responsible for any sewer discharge to the surface due to failure in bypass hose, piping or other equipment. Any discharge from air release valves shall be contained. The Contractor shall ensure that raw sewage will

not spill on the ground or into any bodies of water, channel, or conduits of conveyance of storm water during the performance of this work. Prior to removal of the bypass pumping pipe, the Contractor shall empty all sewage into the sewer system. The Contractor is responsible for and shall indemnify and hold the Owner harmless for any sanitary sewer discharge to the environment due to a failure in the equipment and/or bypassing operation.

In the event of a sanitary sewer overflow, the Contractor shall contact the Owner's representative immediately and complete the Contractor Unpermitted Discharge Reporting Form provided by the Owner. If there is a sanitary sewer discharge to the environment due to a failure in the equipment and/or bypassing operation, the Contractor shall reimburse the Owner all costs related in any way to compliance with laws, regulatory requirements, and/or court orders and decrees associated with the overflow or discharge event. The costs include by not limited to water quality monitoring, signage, cleanup, fines, legal fees, claims, and reporting. In the event that the peak flows during the bypass pumping operation exceed the projected peak flow figures previously provided by the Owner and a sanitary sewer overflow event occurs when the Contractor's equipment is operating correctly, the Contractor will not be held liable for the sanitary sewer overflow or discharge.

<sup>1</sup>Revised & adopted 1/8/01

<sup>2</sup>Section 10.25 – Added & Adopted 4/7/03

The Contractor shall be liable for and shall indemnify and hold the Owner harmless for any other claims made as a result of the sanitary sewer discharge or sanitary sewer overflow due to a failure in the equipment and/or bypassing operation and shall be responsible for all requirements imposed by the regulatory agencies. In addition, the Contractor shall provide notification consisting of one (1) quarter page advertisement published in the Mobile Register within 3 days of the sanitary sewer overflow. The advertisement shall be written in a manner reasonably designed to inform fully the customers of the Owner. The notice shall be conspicuous and shall not use unduly technical language, unduly small print or other methods which would frustrate the purpose of the notice. The notice shall disclose all material facts regarding the subject including the amount of the overflow, when the overflow occurred, any potential adverse health effects, the population at risk, reasonably known methods of mitigation known, and steps being taken to mitigate problems with the by-pass pumping operation. Each notice shall contain the name, business address, and telephone number of the Contractor.

**END OF SECTION**



SPECIAL CONDITIONS TO THE STANDARD SPECIFICATIONS FOR WATER MAINS, SANITARY SEWERS AND  
SEWAGE PUMPING STATIONS, BOARD OF WATER AND SEWER COMMISSIONERS OF THE CITY OF  
MOBILE, ALABAMA

I CONTRACT

PARAGRAPH 6

- The daily charge for Liquidated Damages shall be determined by the Engineer as the sum of charges from the Engineer plus charges by the Owner for additional time expended by its personnel as associated with the overrun of the contract time by the Contractor divided by the number of days of the overrun with the resulting charge not to exceed \$1,000 per day of overrun.

II GENERAL CONDITIONS

SECTION 2 – PROPOSAL REQUIREMENTS AND CONDITIONS

- Paragraph 2.01 GENERAL QUALIFICATIONS OF BIDDERS, 3<sup>RD</sup> paragraph, REPLACE "...minimum of two (2) years' experience immediately preceding the submission of the bid, performing work of a similar scope and complexity..." with "...minimum of five (5) years' experience immediately preceding the submission of the bid, performing work of a similar scope and complexity."

SECTION 3 - AWARD AND EXECUTION OF CONTRACT

- Paragraph 3.01 CONSIDERATION OF BIDS, DELETE "...the approximate estimated quantity of each item multiplied by the unit price bid for than item, the products calculated, and the gross sums bid obtained in each of the acceptable Proposals..."
- Paragraph 3.07 INSURANCE, Paragraph D Owner's Protection Liability, ADD to the coverage: JACOBS, 25 W. Cedar Street, Suite 350, Pensacola, FL 32502.

SECTION 4 – SCOPE OF WORK

- Paragraph 4.06 REMOVAL AND DISPOSAL OF STRUCTURES AND OBSTRUCTIONS, DELETE last sentence and replace with "Compensation for the removal and disposal of the structures and obstructions shall be included in the Lump Sum Bid Price."
- Paragraph 4.02 UNDERGROUND AND EXISTING UTILITIES, ADD "Reference Drawings and reports as directly referred to in the contract documents or as pertinent to the construction are included in the CD of electronic files as supplied to each registered bidder. Hard copies of these documents will not be issued with the bid documents but are hereby included by reference. Those documents include the following which are supplied for information only and without any guaranty of accuracy or completeness:
  1. Williams W.W.T.F. Administration Building Expansion: Compiled Reference Drawings File 1 of 31
  2. CCWmsWWTFPhII-Admin\_Parking (2 sheets)
  3. BCM-1994-CCWmsWWTFUpgrade (11 sheets)
  4. Compiled RTU sheets (206 sheets)
  5. Volkert\_2003\_Dewatering AsBuilt (69 sheets)
  6. Williams\_WWTP\_1956 (86 sheets)
  7. Erwin\_1956\_Admin, Maintenance, and Chlorination (41 sheets)
  8. 13-240 CC Williams WWTP Headworks Geotechnical Report (248 pages)
  9. Geotechnical Report - CC Williams WWTP Dewatering Facility (66 pages)
  10. Geotechnical Report -Addendum - CC Williams WWTP Dewatering Facility (3 pages)
  11. BDI Headworks & Primary Clarifiers Excerpts (39 sheets)

12. Expansion and Upgrading\_1974 (103 sheets)
13. C C Williams Monopole (7 sheets)
14. CCWmsWWTFCI2 Dist - MPI\_3903010-700 - 09-2000 (3 sheets)
15. WmsWWTF4thFinalClarifierAddn-MPI-3903056-06-02 (8 sheets)
16. Security System 2012 scans (7 sheets)
17. SD - BDI Headworks & Primary Clarifiers Grinder PS SD97A APP (105 sheets)
18. SD - Chlorine scrubber excerpts (10 sheets)
19. SD - Ex Belt Press BDP O&M 2.0m 3DP, Excerpts (15 sheets)
20. GreaseTrapWasteTreatmentFacilityWrightSmithJrWWTP\_excerpts (14 sheets)
21. Williams SO2 Bldg (1 sheet)
22. Side Stream Storage (20 sheets)
23. Geotechnical Report – Addendum #2 – CC Williams WWTP Dewatering Facility (3 pages).
24. CC Williams WWTP Asbestos and LBP Survey Report.
25. CC Williams TCLP Report.

## SECTION 8 – PROSECUTION AND PROGRESS

- Paragraph 8.04, ADD the following: ‘Contractor and Subcontractor regular working hours consist of 7 a.m. to 6 p.m., Monday through Friday, excluding observed holidays. Work not requiring real-time observation by the Engineer may be allowed to be performed on weekends, observed holidays, and outside the regular working hours but requires at least 2 days advanced notice and approval by Owner. After-hours work requiring real-time Engineering observation will be allowed on special occasions such as pipe tie-ins upon provision of 7 days advanced notice. Overtime work is work in excess of 40 hours per week. Contractor shall be subject to charges from the Owner for reimbursement of Engineer’s charges associated with after-hours or overtime work observation.
- Paragraph 8.09.B, ADD the following: “If adverse weather conditions are the basis for a claim for additional time, such claim shall be documented by data substantiating that the weather conditions were abnormal for the duration of the contract time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction. The 10-year historic average of rainfall per month, as reported at the Mobile Airport, will be used as a basis to assess the number of rain days allowed. No rain days will be considered when the average rainfall amount is less than 0.1 inches in a day.”
- Paragraph 8.13 PAYMENTS TO CONTRACTOR, 1<sup>st</sup> paragraph, DELETE “...will consider the estimate at its next scheduled meeting, and within ten (10) calendar days after the Board approval...”
- Paragraph 8.18 EXTRA WORK AND FORCE ACCOUNT WORK, ADD Paragraph “C” as follows: “Approval of the use of the Owner’s Contingency Allowance shall be through the execution of an Owner’s Contingency Allowance Allocation form by Owner and contractor with Engineer’s recommendation. The amount of an Owner’s Contingency Allowance allocation shall be determined in the same manner as the determination of the amount for extra work under Paragraph 8.18 with markups limited to those as indicated for force account work. However, there will be no additional cost allowance for bonds and insurance as the total allowance amount is already encompassed in the contractually required bonds and insurance.”

## SECTION 9 – TESTING MATERIALS

- Paragraph 9.01 INSPECTION AND TESTING OF MATERIALS, 4<sup>TH</sup> paragraph, REPLACE “...in the Special Provisions...” with “...” in the technical specifications or drawings...”ADD the following

sentence to the paragraph: "The Contractor shall be responsible for coordinating and scheduling of the required tests. Contractor shall pay for any retesting that may be required due to failure of the initial test."

## SECTION 10 – SPECIAL PROVISIONS

- Paragraph 10.06 SEQUENCE OF OPERATIONS, DELETE paragraph in its entirety.
- Paragraph 10.07 PROJECT DOCUMENTATION, DELETE paragraph in its entirety.
- Paragraph 10.18 BRANDS OF EQUIPMENT AND MATERIAL, ADD the following Paragraphs:

"If Contractor wishes to substitute a different manufacturer than the named manufacturer, Contractor shall propose the substitute at least 14 days prior to the bid opening along with full documentation indicating complete specification compliance of the proposed substitute or identifying any non-compliance and the technical basis for acceptance of the non-compliance. Substitutions after the bid and award of the contract will generally not be approved except for minor subsystems and generically named components at the sole discretion of the Owner.

If Contractor proposes a substitute manufacturer and/or model to the Owner and it is accepted by the Owner, the Contractor shall reimburse Owner for engineering redesign, if necessary, based on the Engineer's salary costs times a multiplier of 3.10. Salary costs are defined as raw labor costs plus salary overheads that are defined as a percentage of wages or salaries of employees working, and premiums measured by or applicable at the time of performance to such wages or salaries such as, but not limited to, worker's compensation, insurance, Social Security, state and federal unemployment insurance, salary continuation insurance, pension plan costs, and prorated allowances for vacation, sick pay, and holiday pay."

- Paragraph 10.19 SIGNS, REPLACE "Appendix F" with "the SRF General Conditions"
- Paragraph 10.20, 4th sentence, REPLACE 'The Contractor shall guarantee the satisfactory operation of all apparatus and machinery against defects in workmanship, material, and installation for a period of one year from date of final acceptance' with 'The Contractor shall guarantee the satisfactory operation of all apparatus and machinery against defects in workmanship, material, and installation for a period as stated in Section 5, CONTROL OF WORK.'
- Paragraph 10.22 MAXIMUM TRENCH WIDTH, DELETE paragraph in its entirety
- Paragraph 10.23 BASIS OF PAYMENT AND METHOD OF MEASURE, DELETE paragraph in its entirety.
- ADD Paragraph 10.26 SITE UTILITY VEHICLES - The contractor shall provide one site utility vehicle for use by the Engineer. Vehicle shall be a Kawasaki Mule SX, with windsheild or approved equal. At the conclusion of the project, the Site Utility Vehicle shall remain the property of the Contractor. Contractor shall provide for all manufacturer recommended and required maintenance and fuel needs of the vehicle for the duration of the contract.
- ADD Paragraph 10.27 ELECTRONIC COMMUNICATIONS – Project communications commencing with the issuance of the Notice to Proceed shall primarily utilize *Prologue*, an internet-based project communications software suite. Prologue will provide a closed communication environment for the prime project participants, which include, but are not limited to the Owner, Engineer, and Contractors. Owner requires use of Prologue for shop drawings, field directives, requests for information, work change directives, requests for proposals, change orders, digital photos, videos, meeting minutes, contract drawings and specifications, construction schedules, submittal tracking, and other information deemed advantageous for the project. In addition to the prescribed electronic submissions of all documents, all final O & M manuals shall be submitted in electronic form and in hard copy in accordance with the specifications. Payment applications and supporting documents will be submitted in hard copy as specified. Otherwise, hard-copies of documents will not be accepted by the Owner or Engineer beyond the acknowledgement of the

Notice to Proceed. E-mail may be utilized for minor electronic communications among project participants.

#### SECTION 11 through SECTION 24

- Where MAWSS standard specification Sections 11 through 24 are in conflict with the technical specifications as herein contained, the MAWSS technical specifications are superseded by the project technical specifications.

#### APPENDIX A through APPENDIX C

- Where MAWSS standard Appendix A through D are in conflict with the technical specifications as herein contained, the MAWSS technical specifications are superseded by the project technical specifications.

#### APPENDIX D through APPENDIX G

- Delete Appendix D through Appendix G in their entirety.

#### APPENDIX I

- Delete Appendix I in its entirety.

#### APPENDIX K through APPENDIX M

- Delete Appendix K through Appendix M in their entirety.



## **APPENDIX H**

### **SMALL AND SMALL DISADVANTAGED BUSINESS**

The Board has established an office for Small and Underutilized Business Development to assist with Bidders on Request in meeting the requirements of this contract.

The service will be provided at no cost to the Bidders.





Board of Water and Sewer Commissioners

Policy No.: Supplier Diversity 16-01

Approved: December 5, 2016

Amended: October 2017

Amended: February 1, 2021

## **SUPPLIER DIVERSITY POLICY FOR PUBLIC WORKS ACT CONTRACTS**

### **PURPOSE:**

The purpose of this policy is to increase meaningful participation of Diverse Contractors/Suppliers in MAWSS contracts, which are subject to the bidding requirements of the Public Works Act, to establish MAWSS's goals for Supplier Diversity participation, and to set forth requirements for the MAWSS Supplier Diversity Program.

### **SCOPE:**

This policy will apply to all MAWSS publicly bid contracts for public works and the consultants who manage these contracts. If a contract is to be paid all or in part with non-MAWSS funds, and a funding entity has Supplier Diversity program requirements that exceed or are more stringent than those of this Policy, then the additional Supplier Diversity policy provisions of the funding entity or entities will also apply as contract requirements. Contracts for public works, which do not meet the dollar threshold for public advertisement for bids, will be subject to MAWSS's Supplier Diversity Policy for Contracts for Goods, Services, and Small Public Works Projects.

In the event that MAWSS must enter into a contract for a public works project on an emergency basis, MAWSS will still seek competitive bids for the work and will declare the nature of the emergency in writing, in accordance with the Public Works Act. MAWSS reserves the right to waive or modify the requirements of this policy if the emergency is adversely affecting or presents an immediate threat to public health, safety, or the environment.

### **DEFINITIONS:**

**Contractor** - An individual or business entity seeking to contract with MAWSS for a public works project and which will function in the role of general contractor for the project.

**Diverse Contractor/Supplier** - A for profit small business concern for which socially and economically disadvantaged individuals own at least a 51% interest and also control management and daily business operations, certified as such on one or more of the lists of Diverse/Contractors Suppliers referenced in this Policy.

## Supplier Diversity 16-01 MAWSS Disadvantage Business Enterprise Policy For Public Works Act Contracts

MAWSS - Mobile Area Water and Sewer System.

Public Works Project - This will be as defined in §39-2-1, Code of Alabama, (1975), as amended.

Subcontractor - For purposes of this Policy, a subcontractor means an individual or business entity which subcontracts with the general contractor to perform work or services for a public works project.

Supplier - For purposes of this Policy, an individual or business entity who enters into a contract with a general contractor to provide materials, equipment, or other products or items for a project.

Supplies - For purposes of this Policy, this term may include materials, equipment, supplies, or other products or items for a project.

Commercial Useful Function –As used in this Policy, refers to the role of a for- profit business which is itself responsible for execution of the contract or a distinct element of the work; refers to a company or individual who actually performs, manages, or supervises the work involved, or who itself furnishes supplies, goods, or services. It is the intent of this Policy that contracts shall be awarded only to entities, which perform commercially useful functions, as opposed to entities that only serve a “pass-through” function.

### **POLICY:**

It is MAWSS policy that Diverse Contractors/Suppliers be given ample and fair opportunities to do business with MAWSS, either directly or indirectly, by ensuring that contractors who enter into publicly bid public works contracts with MAWSS make earnest and diligent efforts to include Diverse Contractors/Suppliers as subcontractors and suppliers. Contractors who wish to bid on a MAWSS public works project shall take all necessary and reasonable steps in accordance with this Policy to ensure that Diverse Contractors/Suppliers have the maximum allowable opportunity to compete for subcontracts and supplier contracts for the project.

This Policy shall be race and gender-neutral. Contractors shall not discriminate in awarding subcontracts and supplier contracts on the basis of race, color, national origin, ethnicity, or sex, during the bid process as well as during performance of a MAWSS public works contract.

**It is MAWSS’s goal that in contracts for public works, contractors shall make a demonstrated good faith effort to award fifteen percent (15%) of the contract amount to certified Diverse Contractors/Suppliers as subcontractors and/or suppliers performing commercially useful functions which are consistent with contract requirements.** This percentage shall be considered a target which is subject to modifications and may be waived or adjusted by MAWSS if the contractor, after demonstrating a good faith effort, is unable to comply with the 15% goal. However, the requirement that a contractor demonstrate a good faith effort shall not be considered informality subject to waiver, except in cases of emergency as noted above.

### **IMPLEMENTATION - THE MAWSS SUPPLIER DIVERSITY PROGRAM:**

A. Lists of Certified Diverse Contractors/Suppliers:

**All contractors submitting bids for MAWSS public works contracts are required to utilize MAWSS’s most recent list of certified Diverse Contractors/Suppliers in their efforts to meet their good faith**

## Supplier Diversity 16-01 MAWSS Disadvantage Business Enterprise Policy For Public Works Act Contracts

**Supplier Diversity requirements.** Bidders may also use the other lists specified below. If a bidder plans to use a Diverse Contractor/Supplier from one of the other lists, the bidder must notify MAWSS's Supplier Diversity Office so that the Diverse Contractors/Supplier's certification can be verified.

MAWSS's list of certified Diverse Contractors/Suppliers includes a description of the areas for which each Diverse Contractor/Supplier can provide services or supplies. **Contractors are required to use Diverse Contractors/Suppliers only in the areas for which the Diverse Contractors/Suppliers are certified.**

Diverse Contractors/Suppliers may be selected from the following lists:

- MAWSS List of Certified Diverse Contractors/Suppliers - [www.mawss.com](http://www.mawss.com) (Reciprocity from the following)
- Alabama Department of Transportation Certified List - [www.dot.state.al.us](http://www.dot.state.al.us)
- SRMSDC Certified List [Southern Region Minority Supplier Development Council] [www.srmsdc.org](http://www.srmsdc.org)
- ADECA Certified List [Alabama Department of Economic and Community Affairs] [www.adeca.alabama.gov](http://www.adeca.alabama.gov)
- WBENC Women's Business Enterprise National Council - [www.wbenc.org](http://www.wbenc.org)
- VOSBA Veteran's Office of Small Business Administration – [www.VOSBA.org](http://www.VOSBA.org)

A contractor may also contact MAWSS's Supplier Diversity Office if the contractor knows of a Diverse Contractor/Supplier who would like to be added to the MAWSS certified list in order to qualify as a subcontractor or a supplier. The MAWSS Supplier Diversity Office will work with the contractor and the Diverse Contractor/Supplier to determine if the Diverse Contractor/Supplier meets certification requirements.

The current listings of Diverse Contractors/Suppliers certified by MAWSS are available on MAWSS's website: [www.mawss.com](http://www.mawss.com) or by contacting MAWSS's Supplier Diversity Office at (251) 694-3194.

### B. Supplier Diversity Requirements:

**Contractors who wish to enter into a public works contract with MAWSS must make good faith efforts to comply with MAWSS's goals for Diverse Contractor/Supplier participation by learning about, contacting, and negotiating with potential Diverse Contractors/Suppliers who are able and available to provide work or supplies for the project.**

In addition to obtaining lists of certified Diverse Contractors/Suppliers, Contractors will contact organizations, which provide assistance to Diverse Contractors/Suppliers and obtain contact information for Diverse Contractors/Suppliers available to provide services and materials. A list of such organizations is available from the MAWSS Supplier Diversity Office.

Contractors will then contact certified Diverse Contractors/Suppliers to obtain prices and other information necessary for the contractor to evaluate the possibility of participation by Diverse Contractors/Suppliers.

Contractors bidding on MAWSS public works projects must list all Diverse Contractor/Supplier subcontractors and suppliers on the **Subcontracting Plan form** submitted in the bid package and sign the form. When

## Supplier Diversity 16-01 MAWSS Disadvantage Business Enterprise Policy For Public Works Act Contracts

preparing a bid, the bidding contractor must obtain firm prices from all Diverse Contractors/Suppliers. The bid package must include correspondence from each Diverse Contractor/Supplier subcontractor/supplier on the Diverse Contractors/Suppliers letterhead in which the Diverse Contractor/Supplier confirms negotiated terms for the subcontract or supply contract, including compensation and a brief description of the scope of work or the items to be supplied.

If a contractor bidding for a MAWSS contract is unable to meet the 15% goal for Supplier Diversity participation for the project, the contractor must note this on the Subcontracting Plan form, state what percentage of the goal was achieved, if any, and sign the form. The contractor must also submit an **Affidavit of Contractor's Good Faith Efforts to Meet Supplier Diversity Goals** with the bid package setting forth the reasons the goal could not be achieved for this project. The Affidavit must include names, addresses, and contact information for each Diverse Contractor/Supplier contacted, a description of information provided to each, and a statement regarding each as to why an agreement for a subcontract or supply contract was not reached. The Affidavit must include description of the good faith efforts made to obtain Supplier Diversity participation, referencing the factors listed below. Documentation supporting the statements in the Affidavit must be attached thereto.

### C. Demonstrating good faith efforts to meet MAWSS's Supplier Diversity goals for a public works contract:

When bids are received for a public works contract, MAWSS's Supplier Diversity Office will review the submittals relative to Supplier Diversity Program requirements to determine if a bidder has demonstrated a good faith effort to reach MAWSS's Diverse Contractor/Supplier participation goal, the MAWSS Supplier Diversity Office will review and consider bidder's submitted documentation as to the following factors:

- Did the bidder obtain the MAWSS List of Certified Diverse Contractor/Supplier entities? What other lists of certified Diverse Contractors/Suppliers did the bidder use, if any?
- Did the bidder use the services of available community organizations, small and/or disadvantaged business groups, local, state, and federal small or disadvantaged business assistance offices, and other organizations which provide assistance in recruitment and placement of Diverse Contractors/Suppliers, to obtain information and contact information for Diverse Contractors/Suppliers who might be able to perform work or furnish supplies for the project?
- Did the bidder attend pre-bid meetings scheduled by MAWSS to which Diverse Contractors/Suppliers were also invited, to inform Diverse Contractors/Suppliers of opportunities to provide services or supplies for the project?
- Did the bidder advertise in general circulation media and trade association publications concerning Diverse Contractor/Supplier opportunities for the project and give potential subcontractors and suppliers reasonable time to respond and negotiate?
- Did the bidder provide written notice to a reasonable number of Diverse Contractor/Supplier firms and allow them sufficient time to respond and negotiate?

## Supplier Diversity 16-01 MAWSS Disadvantage Business Enterprise Policy For Public Works Act Contracts

- Was the information provided by the bidder to potential Diverse Contractor/Supplier subcontractors and suppliers adequate to apprise them of the plans, specifications, and requirements for the project?
- If the bidder received initial solicitations from interested Diverse Contractors/Suppliers, did the bidder follow up by contacting the Diverse Suppliers again to determine if the Diverse Contractors/Suppliers were interested in subcontracting or furnishing supplies for the project?
- What efforts did the bidder make to determine whether the project specifications, drawings, and other documents presented opportunities for participation by Diverse Contractors/Suppliers? Did the bidder select certain portions of the work as suitable for performance by Diverse Contractor/Supplier subcontractors, or break down the work into smaller parts in order to allow participation by Diverse Contractors/Suppliers?
- For any Diverse Contractor/Supplier determined by the bidder to be unqualified or unable to participate, did the bidder offer a reasonable justification for the bidder's decision not to utilize that Diverse Contractor/Supplier?
- If the bidder contacted the MAWSS Supplier Diversity Office requesting that potential subcontractors or suppliers be considered for addition to the MAWSS certification list, this should also be documented and will be considered by MAWSS.

The foregoing list is not exclusive. Other efforts to comply may be documented by a bidder for consideration by MAWSS.

Bidders shall have until the close of business on the fourth day after the bid opening to submit complete information in compliance with the Supplier Diversity Program. Additional information, such as clarifying documentation, provided after the close of business on the fourth day after the bid opening shall only be provided and/or accepted upon request of the MAWSS' Supplier Diversity Office and such information shall be submitted as expeditiously as possible so MAWSS can determine if the bid is in compliance with this policy.

**Contractors are hereby notified that bids which do not comply with MAWSS's Supplier Diversity Policy and Program requirements may be rejected as non-responsive.**

### D. Continuing compliance with the MAWSS Supplier Diversity Program during performance of contract:

MAWSS's Supplier Diversity Office will monitor continuing compliance with the Supplier Diversity Program requirements as contracts are performed.

**If a subcontract or supply contract with a Diverse Contractor/Supplier is terminated prior to its termination date, the contractor must notify MAWSS's Supplier Diversity Office.** This notification must include the reasons for the early termination as well as a description of efforts made by the contractor to engage another certified Diverse Contractors/Suppliers as a replacement subcontractor or supplier.

**The contractor must file a written report with MAWSS's Supplier Diversity Office once a month documenting the contractor's continuing compliance with the Supplier Diversity Program.** This report will list all Diverse Contractor/Supplier subcontractors and suppliers currently performing work or providing supplies for the project.

Information and data requested by the Supplier Diversity Office regarding compliance with the Supplier Diversity Program must be promptly provided by the contractor. Contractors shall make available to MAWSS's Supplier Diversity Office all records pertaining to use of Diverse Contractor/Supplier subcontractors and suppliers.

MAWSS reserves the right to make site visits to project locations to confirm compliance with Supplier Diversity Program requirements.

**A contractor's failure to comply with this policy and MAWSS's Supplier Diversity program requirements during performance of a contract may be considered a breach of the contract and may result in its termination.**

**By entering into a contract with MAWSS, a contractor acknowledges and agrees that failure to comply with MAWSS's Supplier Diversity Program requirements relative to that contract shall be grounds for its termination by MAWSS.**

**Failure by a contractor performing a public works project for MAWSS to comply with the Supplier Diversity Program requirements may result in that contractor being determined "not a responsible bidder" in bids for future MAWSS contracts.**

Contractors must maintain for three (3) years such records as are necessary to determine compliance with MAWSS's Supplier Diversity policy.

E. MAWSS tracking of Supplier Diversity Program Achievements:

MAWSS's Supplier Diversity Manager will report to the MAWSS Board semi-annually, in January and in July of each year, on Supplier Diversity utilization and on other efforts by MAWSS's Supplier Diversity Office to enhance Diverse Contractor/Supplier participation in MAWSS's public works contracts.

MAWSS may also contract for Disparity Studies as determined by the Board, to provide further information to enhance MAWSS's Supplier Diversity Program.



# CONTRACTOR'S SUPPLIER DIVERSITY PROGRAM UTILIZATION REPORT

(To Be Submitted with Contractor's Closeout Documents)

Contract No.: \_\_\_\_\_ Contract Description: \_\_\_\_\_

Contractor: \_\_\_\_\_

Original Contract Amount (OCA): \$ \_\_\_\_\_ Final Contract Amount: \$ \_\_\_\_\_

Contract Notice To Proceed Date: \_\_\_\_\_ Contract Completion Date: \_\_\_\_\_

Supplier Diversity Program Sub-Contractor/Sub-Consultant	Type of Work	SDP Type **	Original Estimated Sub-Contract Amount***	Original Estimated SDP Percentage of Contract	Final SDP Subcontract Amount	Final SDP Subcontract Percentage of TPB
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%
			\$	%	\$	%

Total SDP Sub-contract Amount: \$ \_\_\_\_\_  
Total SDP Sub-contract Percentage Amount: \_\_\_\_\_ %

Signed: \_\_\_\_\_

(Contractor Authorized Representative)

Print Name: \_\_\_\_\_

Date: \_\_\_\_\_

\* MBE, WBE, DBE  
\*\* Amount Identified in Sub-contracting Plan



## **Change of Sub-Contractor Form**

In accordance with MAWSS DBE 16-01

JOB NAME\_\_\_\_\_Location\_\_\_\_\_

Name of General Contractor\_\_\_\_\_

Name of Original Sub-Contractor\_\_\_\_\_

Name of New Sub-Contractor\_\_\_\_\_

Reason for Change\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

This instrument is for the purpose of advising all persons involved of a change being made on the contract and job-site.

\_\_\_\_\_

General Contractor

\_\_\_\_\_

Supplier Diversity Office

\_\_\_\_\_

Asst. Director



## **APPENDIX J**

### **IRREVOCABLE STANDBY LETTER OF CREDIT**



\_\_\_\_\_  
(BANK)

DATE: \_\_\_\_\_

<b>IRREVOCABLE STANDBY LETTER OF CREDIT</b>	CREDIT NUMBER _____
<b>IN FAVOR OF:</b>  Board of Water and Sewer Commissioners of the City of Mobile, Alabama	<b>FOR ACCOUNT OF:</b>  _____ (Contractor)  _____ (Address)
<b>AMOUNT:</b> Up to the aggregate amount of  \$ _____	<b>EXPIRATION DATE</b> _____ <b>AT OUR COUNTERS IN MOBILE, ALABAMA</b>
<b>Gentlemen:</b>  We hereby establish our irrevocable standby letter of credit No. _____ in your favor available by your draft(s) drawn on us at sight when accompanied by the following document:  1. Statement purportedly signed by an authorized representative of the Board of Water and Sewer Commissioners of the City of Mobile, Alabama certifying that _____ _____(Contractor) is in default under the terms of the agreement for the _____ Project No. _____	
Any reference to the agreement is for informational purpose only, the agreement does not represent an integral part of this letter of credit.  All draft(s) drawn under this credit must be marked: Drawn under _____ _____(Bank) Mobile letter of credit No. _____, dated _____.  Partial drawings are permitted.	
<b>THE ORIGINAL OF THIS LETTER OF CREDIT MUST BE PRESENTED WITH ANY DRAWING</b>	
We hereby engage with you that drafts drawn under and in compliance with the terms of the credit will be duly honored upon presentation and delivery of the documents as specified.  Except so far as otherwise expressly stated, this documentary credit is subject to the "Uniform Customs and Practice for Documentary Credits" fixed by the International Chamber of Commerce in effect as of the date of issuance hereof.	_____, Mobile (Bank)  _____ Authorized Signature  _____ Authorized Signature





# BID BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, Creel Company, Inc.  
(Name of Bidder)

3762 Moffett Road, Mobile, AL 36618, as Principal,  
(Address)

and Westfield Insurance Company  
(Name of Surety)

of P.O. Box 5001, Westfield Center, OH 44251, as Surety,  
(Address)

jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Board of Water and Sewer Commissioners of the City of Mobile, Alabama, as the Owner, in the **PENAL SUM** of five percent (5%) of the amount of the Principal's bid, but in no event more than **Ten Thousand Dollars (\$10,000.00)**.

**THE CONDITION OF THIS OBLIGATION** is that the Principal has submitted to the Owner the attached bid, which is incorporated herein by reference, for the Project identified as:

CC Williams WWTP Dewatering and Other Improvements Project No. D3226100

**NOW, THEREFORE**, if, within the terms of the Bid Documents, the Owner accepts the Principal's bid and the Principal thereafter either:

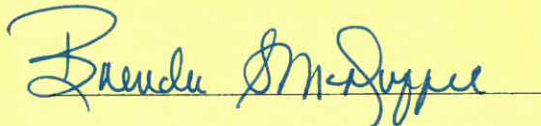
- (a) executes and delivers a Construction Contract with the required Contract and Labor and Material Bonds (each in the form contained in the Bid Documents and properly completed in accordance with the bid) and delivers evidence of insurance as prescribed in the Bid Documents, or
- (b) fails to execute and deliver such Construction Contract with such Bonds and evidence of insurance, but pays the Owner the difference, not to exceed the Penal Sum of this Bond, between the amount of the Principal's Bid and the larger amount for which the Owner may award a Construction Contract for the same Work to another bidder,

**then**, this obligation shall be null and void, otherwise it shall remain in full force and effect.

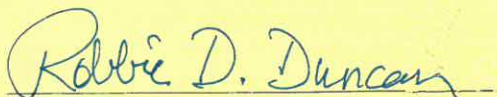
The Surety, for value received, hereby stipulates and agrees that the obligation of the Surety under this Bond shall not in any manner be impaired or affected by any extension of the time within which the Owner may accept the Principal's bid, and the Surety does hereby waive notice of any such extension.

**SIGNED AND SEALED** this 3rd day of May, 2021.

ATTEST:



ATTEST:



Approved 11/21/2016

PRINCIPAL:

Creel Company, Inc.

By 

Name and Title Bruce G. Creel, President

SURETY:

Westfield Insurance Company

By 

Name and Title Julie C. Livingston,  
**Attorney-in-Fact**



General  
Power  
of Attorney

CERTIFIED COPY

POWER NO. 0120172 00

**Westfield Insurance Co.  
Westfield National Insurance Co.  
Ohio Farmers Insurance Co.**  
Westfield Center, Ohio

Know All Men by These Presents, That WESTFIELD INSURANCE COMPANY, WESTFIELD NATIONAL INSURANCE COMPANY and OHIO FARMERS INSURANCE COMPANY, corporations, hereinafter referred to individually as a "Company" and collectively as "Companies," duly organized and existing under the laws of the State of Ohio, and having its principal office in Westfield Center, Medina County, Ohio, do by these presents make, constitute and appoint  
**DALE A. TAYLOR, ROBBIE D. DUNCAN, JULIE C. LIVINGSTON, SANDY M. BOWDEN, DEBORAH P. TRAWICK, TERECE D. SHEHAN, RANDALL J. TURNER, WARREN W. HOPPER, JOINTLY OR SEVERALLY**

of MONTGOMERY and State of AL its true and lawful Attorney(s)-in-Fact, with full power and authority hereby conferred in its name, place and stead, to execute, acknowledge and deliver any and all bonds, recognizances, undertakings, or other instruments or contracts of suretyship-

**LIMITATION: THIS POWER OF ATTORNEY CANNOT BE USED TO EXECUTE NOTE GUARANTEE, MORTGAGE DEFICIENCY, MORTGAGE GUARANTEE, OR BANK DEPOSITORY BONDS.**

and to bind any of the Companies thereby as fully and to the same extent as if such bonds were signed by the President, sealed with the corporate seal of the applicable Company and duly attested by its Secretary, hereby ratifying and confirming all that the said Attorney(s)-in-Fact may do in the premises. Said appointment is made under and by authority of the following resolution adopted by the Board of Directors of each of the WESTFIELD INSURANCE COMPANY, WESTFIELD NATIONAL INSURANCE COMPANY and OHIO FARMERS INSURANCE COMPANY:

"Be It Resolved, that the President, any Senior Executive, any Secretary or any Fidelity & Surety Operations Executive or other Executive shall be and is hereby vested with full power and authority to appoint any one or more suitable persons as Attorney(s)-in-Fact to represent and act for and on behalf of the Company subject to the following provisions:

The Attorney-in-Fact may be given full power and authority for and in the name of and on behalf of the Company, to execute, acknowledge and deliver, any and all bonds, recognizances, contracts, agreements of indemnity and other conditional or obligatory undertakings and any and all notices and documents canceling or terminating the Company's liability thereunder, and any such instruments so executed by any such Attorney-in-Fact shall be as binding upon the Company as if signed by the President and sealed and attested by the Corporate Secretary."

"Be it Further Resolved, that the signature of any such designated person and the seal of the Company heretofore or hereafter affixed to any power of attorney or any certificate relating thereto by facsimile, and any power of attorney or certificate bearing facsimile signatures or facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached." (Each adopted at a meeting held on February 8, 2000).

In Witness Whereof, WESTFIELD INSURANCE COMPANY, WESTFIELD NATIONAL INSURANCE COMPANY and OHIO FARMERS INSURANCE COMPANY have caused these presents to be signed by their National Surety Leader and Senior Executive and their corporate seals to be hereto affixed this 02nd day of JANUARY A.D., 2020.

Corporate  
Seals  
Affixed



WESTFIELD INSURANCE COMPANY  
WESTFIELD NATIONAL INSURANCE COMPANY  
OHIO FARMERS INSURANCE COMPANY

By:   
Gary W. Stumper, National Surety Leader and  
Senior Executive

State of Ohio  
County of Medina ss.:

On this 02nd day of JANUARY A.D., 2020, before me personally came Gary W. Stumper to me known, who, being by me duly sworn, did depose and say, that he resides in Hartford, CT; that he is National Surety Leader and Senior Executive of WESTFIELD INSURANCE COMPANY, WESTFIELD NATIONAL INSURANCE COMPANY and OHIO FARMERS INSURANCE COMPANY, the companies described in and which executed the above instrument; that he knows the seals of said Companies; that the seals affixed to said instrument are such corporate seals; that they were so affixed by order of the Boards of Directors of said Companies; and that he signed his name thereto by like order.

Notarial  
Seal  
Affixed





David A. Kotnik, Attorney at Law, Notary Public  
My Commission Does Not Expire (Sec. 147.03 Ohio Revised Code)

State of Ohio  
County of Medina ss.:

I, Frank A. Carrino, Secretary of WESTFIELD INSURANCE COMPANY, WESTFIELD NATIONAL INSURANCE COMPANY and OHIO FARMERS INSURANCE COMPANY, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney, executed by said Companies, which is still in full force and effect; and furthermore, the resolutions of the Boards of Directors, set out in the Power of Attorney are in full force and effect.

In Witness Whereof, I have hereunto set my hand and affixed the seals of said Companies at Westfield Center, Ohio, this 3rd day of May 2021 A.D.,



  
Frank A. Carrino, Secretary

### INFORMATION FOR BIDDERS

- No bid will be accepted or read from a bidder who is not on the list of entities who have requested the contract documents as per the Invitation to Bid.
- Bid submission must utilize the tabbed page dividers and color-coded bid pages as provided with the CD of the contract documents to emulate the bid example as provided by MAWSS as located on the CD containing the contract document electronic files. Bidder may elect to electronically fill in the bid documents, print them to the required colored paper (as provided) and substitute in those pages for the color-coded bid package pages. Bid shall include the following items printed on the color paper as indicated as follows with all blanks filled in as required to form a complete bid:

Item	Paper Color
Invitation for Bid	White
Page divider tabbed "ADDENDUMS"	Yellow
All issued addendums	White
Page Divider tabbed "BID TOTAL"	Yellow
Proposal Page 1	White
Proposal Pages 2, 3, 4, 5 and 6	Yellow
Page divider tabbed " SSO NOTIFICATION "	Yellow
Proposal Page 7 <u>SSO and Unpermitted Discharge Prevention Notification</u>	Yellow
Page divider tabbed "SUBCONTRACTING PLAN"	Yellow
SUBCONTRACTING PLAN	Yellow
MAWSS DBE Policy with Change of Sub-Contractor Form (7 pages)	White
Page divider tabbed "BID BOND"	Yellow
Bid Bond form	Yellow
Page divider tabbed "OTHER"	Yellow
Any other documents as required for a complete bid	White

- Guarantee will be required with each bid for at least 5% of the amount of the bid not to exceed \$10,000 filed in the form of a certified check, Bid Bond, or irrevocable Letter of Credit acceptable to the Owner payable to the Board of Water & Sewer Commissioners of the City of Mobile, Alabama. Bid Bonds shall include certification that the bonding company is listed in Circular 570 of the U. S. Treasury Department. The name, address, telephone number, and contact person for the bonding company shall also be included.

- The Contractor shall furnish either a "Contract Bond" and a "Labor and Material Bond" or an irrevocable "Letter of Credit" acceptable to the Owner. All bonds and letters of credit shall be for 100% of the contract price.
- Bids must be submitted upon the Standard forms furnished by the Board of Water & Sewer Commissioners of the City of Mobile, Alabama, included in the Project Specifications. Bidders shall be listed as plan holders.
- The right is reserved, as the interest of the Owner may require, to reject any and all bids and to waive any informalities in bids received. Failure to complete and sign the "Proposed Subcontracting Plan" in the Proposal will be cause for rejection of bid. In the event that no subcontractors will be used, the form shall read zero and shall be signed.
- Bidder's and Contractor's compliance with the MAWSS Disadvantaged Business Enterprise Policy for Public Works Acts Contracts as herein included is an integral component of the bidding process and the contract performance.
- *Sanitary Sewer Overflows (SSOs) and unpermitted discharges of wastewater to the environment are a violation of Federal and State laws, as well as a breach of this Contract. The Contractor and associated subcontractors, vendors, and other entities and persons chosen to complete this Work shall not, through act or omission, discharge untreated wastewater to the environment or cause wastewater to back up into a building. The Contractor hereby agrees to indemnify the Owner if the Owner is assessed penalties or fines, receives regulatory actions, or has actions, suits, or claims filed against it by any person or entity as a result of SSOs or unpermitted discharges caused by act or omission of the Contractor and/or any entity or person performing Work in the Contractor's behalf under this contract. The Contractor shall reimburse the owner for all damages, losses, penalties, fines, judgments, interest, costs, and expenses of every nature incurred by the Owner, including but not limited to reasonable attorneys' fees, arising from or associated with each SSO or unpermitted discharge. In addition, the Contractor shall pay the penalties as identified in the Contract Documents to the Owner for SSOs and unpermitted discharges caused by the Contractor and/or entity or person performing Work in the Contractor's behalf, regardless of whether such SSOs or discharges reach waters of the State.*
- Failure to complete the "SSO and Unpermitted Discharge Prevention Notification" in the Proposal will be cause for rejection of bid.

- The Owner's intent is to use funding through the Clean Water State Revolving Loan for this project. Additional requirements beyond those of the Board of Water and Sewer Commissioners of the City of Mobile, Alabama and the State of Alabama bid law are included in this project and are outlined in Supplemental General Conditions for SRF Assisted Wastewater Facilities Construction Contracts of the project specifications. Pages SGC-8, SGC-10, SGC-22, SGC-23 and SGC-36 of the Supplemental General Conditions shall be completed by the lowest bidder and submitted to the Engineer prior to the award of the Contract.
- For the Bidder's satisfaction of the requirements of Section 2 of the General Conditions Paragraph 2.04 to visit the site of the work, the Owner will make available the site for inspection by official document holders during normal business hours Monday through Friday from March 29, 2021 through April 16, 2021. Such inspections must be requested by email to Baryy Smith at [BASMITH@mawss.com](mailto:BASMITH@mawss.com) with a CC to [dtillman@mawss.com](mailto:dtillman@mawss.com) at least 24 hours in advance of the intended inspection and scheduled at a mutually convenient date and time. Inspections will be unguided and plant staff will not be available for nor responsive to questions. Additionally, all visitors must strictly observe all CDC guidance for social separation as associated with COVID-19 and must limit their inspections to areas directly involved in the work.



**State of Alabama**  
**Alabama Department of Environmental Management**  
**State Revolving Fund (SRF) Loan Program**



SRF Section  
Permits and Services Division  
Alabama Department of Environmental  
Management  
Post Office Box 301463  
Montgomery, Alabama 36130-1463

(334) 271-7796  
(334) 271-7950 FAX

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## **Supplemental General Conditions**

### **for SRF Assisted**

Public Drinking Water and Wastewater  
Facilities Construction Contracts



SRF Project Number: \_\_\_\_\_

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## I – ADEM Special Conditions

1. Construction within State right-of-way shall be in accordance with Alabama Department of Transportation policies and procedures.
2. Construction is to be carried out in compliance with applicable NPDES permits and in a manner that prevents bypassing of raw wastewater flows during construction. If bypassing is anticipated, the ADEM NPDES Enforcement Branch (334-271-7975) shall be advised in advance and the contractor shall take all necessary steps to minimize the impacts of bypassing.
3. Siltation and soil erosion shall be minimized during construction. The contractor shall obtain an NPDES storm water permit for construction if required.
4. The owner shall provide and maintain competent and adequate supervision and inspection.
5. ADEM and EPA shall have access to the site and the project work at all times.
6. These Special Conditions shall supersede any conflicting provisions of this contract.
7. A project sign is required. See **Parts XVII and XVIII, pages SGC-34 – SGC-35**, for more information.

## II – Bonds and Insurance

Bonding requirements shall comply with Alabama Act No. 97-225. Provisions of the Act are summarized below:

1. Bid Bond – Not less than 5% of either the owner's estimated cost or of the contractor's bid up to a maximum \$10,000. The bid guarantee shall consist of a cashier's check drawn on an Alabama bank or a bid bond executed by a surety company duly authorized and qualified to make bonds in the State of Alabama.
2. Performance Bond – 100% of the contract price.
3. Payment Bond – Payable to the awarding authority, shall be executed in an amount not less than 50% of the contract price.

In addition to the insurance requirements elsewhere in the specifications, the owner or the contractor, as appropriate, must acquire any flood insurance made available by the Federal Emergency Management Agency as required by 40 CFR 30.600 (b), if construction will take place in a flood hazard area identified by the Federal Emergency Management Agency.

## III – Utilization of Disadvantaged Businesses Enterprises (DBEs)

It is the policy of the State Revolving Loan Fund (SRF) to promote a "fair share" of sub-agreement awards to small, minority, and women-owned businesses for equipment, supplies, construction, and services. Compliance with these contract provisions is required in order for project costs to be eligible for SRF funding. The "fair share" objective is a goal, not a quota.

Failure on the part of the apparent successful bidder to submit required information to the loan recipient (Owner) may be considered by the Owner in evaluating whether the bidder is responsive to bid requirements.

The project objectives for utilization of Minority Business Enterprises (MBE's) and Women's Business Enterprises (WBE's) are as follows:

Commodities (Supplies)	MBE 4%	WBE 11%
Contractual (Services)	MBE 8%	WBE 30%
Equipment	MBE 5%	WBE 20%
Construction	MBE 2.5%	WBE 3%

For purposes of clarification:

- This objective applies to any Federally assisted procurement agreement in excess of \$10,000.
- This objective necessitates three responsibilities; separate solicitations must be made of small and minority and women's business enterprises.
- A minority business is a business, at least 51 percent of which is owned and controlled by minority group members (Black; Hispanics; Asian American; American Indian; and, any other designations approved by the Office of Management and Budget).
- A women's business is a business, at least 51 percent of which is owned and controlled by one or more women.
- The control determination will revolve around the minority or woman owner's involvement in the day-to-day management of the business enterprise.
- Solicitation should allow adequate time for price analysis; ADEM recommends that contact be made no later than 15 days before bid opening.
- Efforts taken to comply with this objective must be documented in detail; maintain records of firms contacted, including any negotiation efforts to reach competitive price levels, and awards to the designated firms.
- ADEM recommends that the prime contractor utilize the services of the Minority Business Development Service Centers. These Centers are funded by the U.S. Department of Commerce to provide technical, financial and contracting assistance to minority and women's business enterprises. These Centers are located in a number of Regional cities.
- Use of the services provided by Centers does not absolve the prime contractors from pursuing additional efforts to meet this objective.

#### IV – Six Affirmative Steps for Good Faith DBE Solicitation

The loan recipient shall follow the six affirmative steps found in the SRF application when using loan funds to procure sources of supplies, construction and services.

If the successful bidder plans to subcontract a portion of the project, the bidder must submit to the owner within 10 days after bid opening, evidence of the affirmative steps taken to utilize small, minority and women's businesses. These six affirmative steps or 'good faith efforts' are required methods to ensure that DBEs have the opportunity to compete for procurements funded by EPA financial assistance dollars. Such affirmative steps are described as follows:

1. Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. This will include placing DBEs on solicitation lists and soliciting them whenever there are potential sources.

2. Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitation for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
3. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. This will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process.
4. Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
5. Use the resources, services, and assistance of the Department of Transportation (DOT), Small Business Administration (SBA), and the Minority Business Development Agency of the Department of Commerce (MBDA).
6. If the Contractor awards subcontracts, it must take the steps described in items (1) through (5) listed above.

## V – Documentation Required from Owner and Contractor

The low, responsive, responsible bidder must forward the following items, in duplicate, to the Owner no later than 10 days after bid opening. The Owner shall transmit one (1) copy of its DBE documentation of the prime contractor solicitation and the bidder's DBE documentation of all subcontractor solicitation to ADEM within 14 days after bid opening.

1. SRF project number and project name.
2. List of subcontractors (name, address and telephone) with dollar amount and duration for subcontracts). If there are to be no subcontractors, please indicate as such.
3. List of any subcontract work yet to be committed with estimate of dollar amount and duration of contract.
4. DBE Documents - See **Part IV, page SGC-3**.
5. Debarred Firms Certification – See **Part XIV, page SGC-23**.
6. Certification Regarding Equal Employment Opportunity – See **Part XIII, page SGC-22**.

The Owner shall submit annual MBE/WBE Utilization Reports (EPA Form 5700-52A, **pages SGC-16 - SGC-17**) within 30 days of the end of the annual reporting period (**October 30<sup>th</sup>**). Submit reports directly to:

Diane Lockwood  
Administrative Section  
Fiscal Branch  
Alabama Department of Environmental Management  
Post Office Box 301463  
Montgomery, Alabama 36130-1463

**The Prime Contractor must submit the following items to the Owner:**

**1) DBE Compliance Form.** The Owner must submit this information to ADEM to demonstrate compliance with the DBE requirements. ADEM's approval is required prior to award of the construction contract and commencement of any SRF-funded construction. **(Page SGC-8)**

**2) Certification Regarding Equal Employment Opportunity.** This form is required for the prime contractor and for all subcontractors. The prime contractor's form should be submitted with the DBE Compliance Form and the subcontractors' forms should be submitted as the subcontracts are executed. **(Page SGC-22)**

**3) Debarred Firms Certification.** This form is required for the prime contractor and for all subcontractors. The prime contractor's form should be submitted with the DBE Compliance Form and the subcontractors' forms should be submitted as the subcontracts are executed. **(Page SGC-23)**

**4) EPA Form 6100-2 DBE Subcontractor Participation Form.** This form gives a DBE subcontractor the opportunity to describe the work the DBE subcontractor received from the prime contractor, how much the DBE subcontractor was paid, and any other concerns the DBE subcontractor might have. The prime contractor must provide this form to each DBE subcontractor for the DBE subcontractor's submittal to ADEM's DBE Coordinator (to be forwarded to EPA's DBE Coordinator). **(Page SGC-10)**

**5) EPA Form 6100-3 DBE Subcontractor Performance Form.** This form captures an intended DBE subcontractor's description of work to be performed for the prime contractor and the price of the work. This form is to be provided by the prime contractor to each DBE subcontractor and submitted with the DBE Compliance Form. **(Page SGC-12)**

**6) EPA Form 6100-4 DBE Subcontractor Utilization Form.** This form captures the prime contractor's intended use of an identified DBE subcontractor and the estimated dollar amount of the work. This form is to be completed by the prime contractor and submitted with the DBE Compliance Form. **(Page SGC-14)**

**7) EPA Form 5700-52 A MBE/WBE Utilization Reports (DBE Annual Report).** The Owner must submit this information to ADEM within 30 days of the end of the annual reporting period **(October 30<sup>th</sup>)**. **(Pages SGC-16 - SGC-17)**

**8) Changes to Approved DBE Compliance Form.** If any changes, substitutions, or additions are proposed to the subcontractors included in previous Department approvals, the Owner must submit this information to the Department for prior approval in order for the affected subcontract work to be eligible for SRF funding. **(Page SGC-21)**

**9) Certified Payrolls.** These should be submitted to the Owner at least monthly for the prime contractor and all subcontractors. The Owner must maintain payroll records and make these available for inspection.

Please note that DBEs, MBEs, and WBEs must be certified by EPA, SBA, or DOT (or by state, local, Tribal, or private entities whose certification criteria match EPA's). DBEs must be certified in order to be counted toward the recipient's MBE/WBE accomplishments. Depending upon the certifying agency, a DBE may be classified as a DBE, a Minority Business Enterprise (MBE), or a Women's Business Enterprise (WBE).

The documentation of these good faith solicitation efforts must be detailed in order to allow for satisfactory review. Such documentation might include fax confirmation sheets, copies of solicitation letters/emails, printouts of the online solicitations, printouts of online search results, affidavits of publication in newspapers, etc. The prime contractor is strongly encouraged to follow up each written, fax, or email solicitation with at least 1 logged phone call.

The prime contractor must employ the six affirmative steps to subcontract with DBEs, even if the prime contractor has achieved its fair share objectives.

If a DBE subcontractor fails to complete work under the subcontract for any reason, the prime contractor must notify the Owner in writing prior to any termination and must employ the six good faith efforts described above if using a replacement subcontractor. Any proposed changes from an approved DBE subcontractor must be reported to the Owner and to ADEM on the Changes to Approved Subcontractors Form prior to initiation of the action. EPA Forms Nos. 6100-3 and 6100-4 must also be submitted to ADEM for new DBE subcontracts.

## VI – Resources for Identifying DBE Contractors/Subcontractors

The following organizations may provide assistance in soliciting DBE participation:

City of Birmingham  
Office of Economic  
Development  
ATTN: Andrew Mayo,  
Economic Specialist  
710 20<sup>th</sup> Street North  
Birmingham, Alabama  
35203  
205/254-2799  
205/254-7741 FAX  
[ajmayo@ci.birmingham.al.us](mailto:ajmayo@ci.birmingham.al.us)

U.S. Small Business  
Administration  
<http://www.pro-net.sba.gov>

National Association of  
Minority  
Contractors (NAMC)  
<http://www.namc-atl.org>

Alabama Department of  
Transportation  
ATTN: John Huffman  
1409 Coliseum Boulevard  
Montgomery, Alabama  
36130  
334-244-6261  
<http://www.dot.state.al.us>

U.S. Department of  
Commerce  
Minority Business  
Development Agency  
401 West Peachtree  
Street NW – Suite 1715  
Atlanta, Georgia 30308  
404/730-3300  
404/730-3313 FAX  
<http://www.mbd.gov/>

Governor's Office of  
Minority and Women's  
Business Enterprises  
401 Adams Avenue  
Suite 360  
Montgomery, Alabama  
36130  
1-800-447-4191  
334/242-2220  
334/242-4203 FAX

Birmingham Construction  
Industrial Authority  
ATTN: Rhonsha Walker  
or Kimberly Bivins  
3600 4<sup>th</sup> Avenue South  
Birmingham, Alabama  
35222  
205/324-6202  
205/324-6210 FAX  
<http://www.BCIA1.org>

### **NOTES:**

**(1) The Owner and the prime contractor shall use the necessary resources to identify and directly solicit no less than 3 certified DBE/MBE firms and 3 WBE firms to bid in each expected contract/subcontract area. If a diligent and documented search of ALDOT, SBA, and MBDA directories does not identify 3 potential certified DBE/MBE firms and 3 potential certified WBE firms, then the prime contractor shall post an advertisement in at least 1 of the other online or print resources. Whenever possible, post solicitation for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.**

**(2) Expenditures to a DBE that acts merely as a broker or passive conduit of funds, without performing, managing, or supervising the work of its subcontract in a manner consistent with normal business practices may not be counted.**

**(3) The prime contractor should attempt to identify and first solicit DBEs in the geographic proximity of the project before soliciting those located farther away.**

**(4) In addition, you may contact ADEM's DBE Coordinator, Diane Lockwood, at (334) 271-7815 for assistance.**

## VII – DBE Compliance Form

**PLEASE NOTE: ALL INFORMATION OUTLINED ON THIS FORM IS REQUIRED FOR DBE COMPLIANCE. THE PROPOSED PRIME CONTRACTOR AND OWNER SHOULD ENSURE THAT THIS INFORMATION IS COMPLETE PRIOR TO SUBMITTAL.**

Loan Recipient: \_\_\_\_\_ SRF Loan Number: \_\_\_\_\_

### **CERTIFICATIONS:**

***I certify that the information submitted on and with this form is true and accurate and that this firm has met and will continue to meet the conditions of this construction contract regarding DBE solicitation and utilization. I further certify that criteria used in selecting subcontractors and suppliers were applied equally to all potential participants and that EPA Forms 6100-2 and 6100-3 were distributed to all DBE subcontractors.***

\_\_\_\_\_  
(Prime Contractor signature) Date \_\_\_\_\_

\_\_\_\_\_  
(Printed name and title)

***I certify that I have reviewed the information submitted on and with this form and that it meets the requirements of the Owner's State Revolving Fund loan contract.***

\_\_\_\_\_  
(Signature of Owner or Owner's representative) Date \_\_\_\_\_

\_\_\_\_\_  
(Printed name and title)

### **GENERAL INFORMATION:**

Owner contact: \_\_\_\_\_

Owner phone number/email: \_\_\_\_\_

Consulting engineer contact: \_\_\_\_\_

Consulting engineer phone number/email: \_\_\_\_\_

Proposed prime contractor: \_\_\_\_\_

Prime contractor contact: \_\_\_\_\_

Prime contractor phone number/email: \_\_\_\_\_

Proposed prime contract amount: \$ \_\_\_\_\_

Proposed total DBE/MBE participation: \$ \_\_\_\_\_ Percentage: \_\_\_\_% Goal: 2.5%

Proposed total WBE participation: \$ \_\_\_\_\_ Percentage: \_\_\_\_% Goal: 3.0%

**Please submit the following with the DBE COMPLIANCE FORM:**

- (1) List of all committed and uncommitted subcontractors by trade, including company name, address, telephone number, contact person, dollar amount of subcontract, and DBE/MBE/WBE status. Indicate in writing if no solicitations were made because the contractor intends to use only its own forces to accomplish the work.
- (2) Proof of certification by EPA, SBA, DOT (or by state, local, Tribal, or private entities whose certification criteria match EPA's) for each subcontractor listed as a DBE, MBE, or WBE.
- (3) Documentation of solicitation effort for prospective DBE firms, such as fax confirmation sheets, copies of solicitation letters/emails, printout of the online solicitations, printouts of online search results, affidavits of publication in newspapers, etc. The prime contractor is strongly encouraged to follow up each written, fax, or email solicitation with at least 1 logged phone call. Whenever possible, post solicitation for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
- (4) Justification for not selecting a certified DBE subcontractor that submitted a low bid for any subcontract area.
- (5) Certification By Proposed Prime Contractor or Subcontractor Regarding Equal Employment Opportunity. **(Page SGC-22)**
- (6) Debarred Firms Certification. **(Page SGC-23)**
- (7) EPA Form 6100-3 DBE Subcontractor Performance Form for all DBE subcontracts. **(Page SGC-12)**
- (8) EPA Form 6100-4 DBE Subcontractor Utilization Form for all DBE subcontracts. **(Page SGC-14)**

# VIII - EPA Form 6100-2 DBE Subcontractor Participation Form



OMB Control No: 2090-0030  
Approved: 8/ 13/ 2013  
Approval Expires: 8/ 31/ 2015

## Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Participation Form

An EPA Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE<sup>1</sup> subcontractor<sup>2</sup> the opportunity to describe work received and/or report any concerns regarding the EPA-funded project (e.g., in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the EPA DBE Coordinator at any time during the project period of performance.

Subcontractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity:	

Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services , Equipment or Supplies	Amount Received by Prime Contractor

<sup>1</sup> A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

<sup>2</sup> Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.



## VIII - EPA Form 6100-2 DBE Subcontractor Participation Form



**OMB Control No: 2090-0030**

**Approved: 8/ 13/ 2013**

**Approval Expires: 8/31/2015**

## Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Participation Form

**Please use the space below to report any concerns regarding the above EPA-funded project:**

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook page.

<b>Subcontractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.



# IX - EPA Form 6100-3 DBE Subcontractor Performance Form



OMB Control No: 2090-0030  
Approved: 8/13/2013  
Approval Expires: 8/31/2015

## Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Performance Form

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

<b>Prime Contractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

<b>Subcontractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

# X - EPA Form 6100-4 DBE Subcontractor Utilization Form



OMB Control No: 2090-0030  
Approved: 8/ 13/ 2013  
Approval Expires: 8/ 31/ 2015

## Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Utilization Form

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE<sup>1</sup> subcontractors<sup>2</sup> and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Issuing/Funding Entity:			

I have identified potential DBE certified subcontractors	<input checked="" type="radio"/> YES	<input type="radio"/> NO	
If yes, please complete the table below. If no, please explain:			
Subcontractor Name/ Company Name	Company Address/ Phone/ Email	Est. Dollar Amt	Currently DBE Certified?

Continue on back if needed

<sup>1</sup> A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

<sup>2</sup> Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

# X - EPA Form 6100-4 DBE Subcontractor Utilization Form



OMB Control No: 2090-0030

Approved: 8/13/2013

Approval Expires: 8/31/2015

## **Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Utilization Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

<b>Prime Contractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

# XI - EPA Form 5700-52A MBE/WBE Utilization Reports

OMB CONTROL NO. 2090-0030  
APPROVED: 05/01/2008  
APPROVAL EXPIRES: 12/22/2013

## U.S. ENVIRONMENTAL PROTECTION AGENCY MBE/WBE UTILIZATION UNDER FEDERAL GRANTS AND COOPERATIVE AGREEMENTS

### PART I. (Reports are required even if no procurements are made during the reporting period.)

<b>1A. FEDERAL FISCAL YEAR</b> (Oct. 1-Sep 30)  20_____	<b>1B. REPORTING PERIOD</b> (Check ALL appropriate boxes) <input type="checkbox"/> 1 <sup>st</sup> (Oct-Dec) <input type="checkbox"/> 2 <sup>nd</sup> (Jan-Mar) <input type="checkbox"/> 3 <sup>rd</sup> (Apr-Jun) <input type="checkbox"/> 4 <sup>th</sup> (Jul-Sep) <input type="checkbox"/> Semi-Annual (Oct-Mar) <input type="checkbox"/> Semi-Annual (Apr-Sep) <input type="checkbox"/> Annual <input type="checkbox"/> Check if this is the last report for the project (Project completed).																				
<b>1C. REVISION OF A PRIOR REPORT?</b> Y or N   Year: _____ Quarter: _____	<b>BRIEFLY DESCRIBE THE REVISIONS YOU ARE MAKING:</b>																				
<b>2A. EPA FINANCIAL ASSISTANCE OFFICE ADDRESS</b> ( ATTN: DBE Coordinator)		<b>3A. RECIPIENT NAME AND ADDRESS</b>																			
<b>2B. EPA DBE COORDINATOR</b>  Name: _____ E-mail: _____	<b>2C. PHONE:</b>  Fax: _____	<b>3B. RECIPIENT REPORTING CONTACT:</b>  Name: _____ E-mail: _____	<b>3C. PHONE:</b>  Fax: _____																		
<b>4A. FINANCIAL ASSISTANCE AGREEMENT ID NUMBER</b> (SRF State Recipients, refer to Instructions for Completion of blocks 4A, 5A and 5C.)		<b>4B. FEDERAL FINANCIAL ASSISTANCE PROGRAM TITLE or CFDA NUMBER:</b>																			
<b>5A. TOTAL ASSISTANCE AGREEMENT AMOUNT</b> (SRF State Recipients, refer to Instructions for Completion of blocks 4A, 5A and 5C.)  EPA Share: \$ _____ Recipient Share: \$ _____		<b>5B. If NO procurement and NO accomplishments were made this reporting period</b> (by the recipients, sub-recipients, loan recipients, and prime contractors), <b>CHECK and SKIP</b> to Block No. 7. ( <u>Procurements</u> are all expenditures through contract, order, purchase, lease or barter of supplies, equipment, construction, or services needed to complete Federal assistance programs. <u>Accomplishments</u> , in this context, are procurements made with MBEs and/or WBEs.)  <div style="text-align: center;"><input type="checkbox"/></div>																			
<b>5C. Total Procurements This Reporting Period</b> (Only include amount not reported in any prior reporting period)  Total Procurement Amount \$ _____ (Include total dollar values awarded by recipient, sub-recipients and SRF loan recipients, including MBE/WBE expenditures.)																					
<b>5D.</b> Were sub-awards issued under this assistance agreement? Yes <input type="checkbox"/> No <input type="checkbox"/> Were contracts issued under this assistance agreement? Yes <input type="checkbox"/> No <input type="checkbox"/>																					
<b>5E. MBE/WBE Accomplishments This Reporting Period</b>  Actual MBE/WBE Procurement Accomplished: (Include total dollar values awarded by recipient, sub-recipients, SRF loan recipients and Prime Contractors.) <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;"><u>Construction</u></th> <th style="text-align: center;"><u>Equipment</u></th> <th style="text-align: center;"><u>Services</u></th> <th style="text-align: center;"><u>Supplies</u></th> <th style="text-align: center;"><u>Total</u></th> </tr> </thead> <tbody> <tr> <td><b>\$MBE:</b></td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td style="text-align: right;">0.00</td> </tr> <tr> <td><b>\$WBE:</b></td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td style="text-align: right;">0.00</td> </tr> </tbody> </table>					<u>Construction</u>	<u>Equipment</u>	<u>Services</u>	<u>Supplies</u>	<u>Total</u>	<b>\$MBE:</b>	_____	_____	_____	_____	0.00	<b>\$WBE:</b>	_____	_____	_____	_____	0.00
	<u>Construction</u>	<u>Equipment</u>	<u>Services</u>	<u>Supplies</u>	<u>Total</u>																
<b>\$MBE:</b>	_____	_____	_____	_____	0.00																
<b>\$WBE:</b>	_____	_____	_____	_____	0.00																
<b>6. COMMENTS:</b> (If no MBE/WBE procurements were accomplished during the reporting period, please explain what steps you are taking to achieve the MBE/WBE Program requirements specified in the terms and conditions of the Assistance Agreement.)																					
<b>7. NAME OF RECIPIENT'S AUTHORIZED REPRESENTATIVE</b>		<b>TITLE</b>																			
<b>8. SIGNATURE OF RECIPIENT'S AUTHORIZED REPRESENTATIVE</b>		<b>DATE</b>																			

EPA FORM 5700-52A available electronically at [http://www.epa.gov/oshp/pdfs/5700\\_52a.pdf](http://www.epa.gov/oshp/pdfs/5700_52a.pdf)

**PART II.**

**MBE/WBE PROCUREMENTS MADE DURING REPORTING PERIOD**

**EPA Financial Assistance Agreement Number: \_\_\_\_\_**

**1 = Construction**  
**2 = Supplies**  
**3 = Services**  
**4 = Equipment**

**Note:** Refer to Terms and conditions of your Assistance Agreement to determine the frequency of reporting. Recipients are required to submit MBE/WBE reports to EPA beginning with the Federal fiscal year quarter the recipients receive the award, continuing until the project is completed.

**EPA FORM 5700-52A - (Approval Expires 12/22/13)**

## Instructions:

### A. General Instructions:

MBE/WBE utilization is based on 40 CFR Part 33. EPA Form 5700-52A must be completed by recipients of Federal grants, cooperative agreements, or other Federal financial assistance which involve procurement of supplies, equipment, construction or services to accomplish Federal assistance programs.

Recipients are required to report 30 days after the end of each federal fiscal quarter, semiannually, or annually, per the terms and conditions of the financial assistance agreement.

	Quarterly Reporting Due Date	Semiannual Reporting Due Date	Annual Reporting Due Date
Agreements awarded prior to May 27, 2008	January 30, April 30, July 30, October 30	N/A	October 30
Agreements awarded on or after May 27, 2008	N/A	April 30, October 30	October 30

MBE/WBE program requirements, including reporting, are material terms and conditions of the financial assistance agreement.

### B. Definitions:

**Procurement** is the acquisition through contract, order, purchase, lease or barter of supplies, equipment, construction or services needed to accomplish Federal assistance programs.

A **contract** is a written agreement between an EPA recipient and another party (also considered "prime contracts") and any lower tier agreement (also considered "subcontracts") for equipment, services, supplies, or construction necessary to complete the project. This definition excludes written agreements with another public agency. This definition includes personal and professional services, agreements with consultants, and purchase orders.

A **minority business enterprise (MBE)** is a business concern that is (1) at least 51 percent owned by one or more minority individuals, or, in the case of a publicly owned business, at least 51 percent of the stock is owned by one or more minority individuals; and (2) whose daily business operations are managed and directed by one or more of the minority owners. In order to qualify and participate as an MBE prime or subcontractor for EPA

recipients under EPA's DBE Program, an entity must be properly certified as required by 40 CFR Part 33, Subpart B.

U.S. citizenship is required. Recipients shall presume that minority individuals include Black Americans, Hispanic Americans, Native Americans, Asian Pacific Americans, or other groups whose members are found to be disadvantaged by the Small Business Act or by the Secretary of Commerce under section 5 of Executive order 11625. The reporting contact at EPA can provide additional information.

A **woman business enterprise (WBE)** is a business concern that is, (1) at least 51 percent owned by one or more women, or, in the case of a publicly owned business, at least 51 percent of the stock is owned by one or more women and (2) whose daily business operations are managed and directed by one or more of the women owners. In order to qualify and participate as a WBE prime or subcontractor for EPA recipients under EPA's DBE Program, an entity must be properly certified as required by 40 CFR Part 33, Subpart B.

Business firms which are 51 percent owned by minorities or women, but are in fact managed and operated by non-minority individuals do not qualify for meeting MBE/WBE procurement goals. U.S. Citizenship is required.

### Good Faith Efforts

A recipient is required to make the following good faith efforts whenever procuring construction, equipment, services, and supplies under an EPA financial assistance agreement. These good faith efforts for utilizing MBEs and WBEs must be documented. Such documentation is subject to EPA review upon request:

1. Include of MBEs/WBEs on solicitation lists.
2. Assure that MBEs/WBEs are solicited once they are identified.
3. Divide total requirements into smaller tasks to permit maximum MBE/WBE participation, where feasible.
4. Establish delivery schedules which will encourage MBE/WBE participation, where feasible.
5. Encourage use of the services of the U.S. Department of Commerce's Minority Business Development Agency (MBDA) and the U.S. Small Business Administration to identify MBEs/WBEs.



## XI - EPA Form 5700-52A MBE/WBE Utilization Reports

6. Require that each party to a subgrant, subagreement, or contract award take the good faith efforts outlined here.

### **C. Instructions for Part I:**

- 1a. Specify Federal fiscal year this report covers. The Federal fiscal year runs from October 1<sup>st</sup> through September 30<sup>th</sup> (e.g. November 29, 2010 falls within Federal fiscal year 2011)

- 1b. Check applicable reporting box, quarterly, semiannually, or annually. Also indicate if this is the last report for the project.

- 1c. Indicate if this is a revision to a previous year, half-year, or quarter, and provide a brief description of the revision you are making.

- 2a-c. Please refer to your financial assistance agreement for the mailing address of the EPA financial assistance office for your agreement.

The "EPA DBE Reporting Contact" is the DBE Coordinator for the EPA Region from which your financial assistance agreement was originated. For a list of DBE Coordinators please refer to the EPA OSBP website at [www.epa.gov/osbp](http://www.epa.gov/osbp). Click on "Regional Contacts" for the name of your coordinator.

- 3a-c. Identify the agency, state authority, university or other organization which is the recipient of the Federal financial assistance and the person to contact concerning this report.

- 4a. Provide the Assistance Agreement number assigned by EPA. A separate report must be submitted for each Assistance Agreement.

**\*For SRF recipients:** In box 4a list numbers for ALL OPEN Assistance Agreements being reported on this form. Please note that although the New DBE Rule (which took effect May 27, 2008) revised the reporting frequency requirements from quarterly to semiannually, that change only applies to agreements awarded AFTER the New DBE Rule took effect. Therefore, SRF recipients may either continue to report activity for all Agreements on one form on a quarterly basis until the last award that was made prior to the New DBE Rule has been closed out; OR, the recipient may split the submission of SRF reports into quarterly reports for Agreements awarded prior the New DBE Rule, and semiannually for the awards made after the New DBE Rule.

- 4b. Refer back to Assistance Agreement document for this information.

- 5a. Provide the total amount of the Assistance Agreement which includes Federal funds plus recipient matching funds and funds from other sources.

**\*For SRF recipients only:** SRF recipients will not enter an amount in 5a. Please leave 5a blank.

- 5b. Self-explanatory.

- 5c. Provide the total dollar amount of ALL procurements awarded this reporting period by the recipient, sub-recipients, and SRF loan recipients, including MBE/WBE expenditures. For example: Actual dollars for procurement from the procuring office; actual contracts let from the contracts office; actual goods, services, supplies, etc., from other sources including the central purchasing/ procurement centers).

**\*NOTE:** To prevent double counting on line 5C, if any amount on 5E is for a subcontract and the prime contract has already been included on Line 5C in a prior reporting period, then report the amount going to MBE or WBE subcontractor on line 5E, but exclude the amount from Line 5C. To include the amount on 5C again would result in double counting because the prime contract, which includes the subcontract, would have already been reported.

- 5d. State whether or not sub-awards and/or subcontracts have been issued under the assistance agreement by indicating "yes" or "no".

- 5e. Where requested, also provide the total dollar amount of all MBE/WBE procurement awarded during this reporting period by the recipient, sub-recipients, SRF loan recipients, and prime contractors in the categories of construction, equipment, services and supplies. These amounts include Federal funds plus recipient matching funds and funds from other sources.

**\*For SRF recipients only:** In 5c please enter the total procurement amount for the quarter, or semiannual period, under all of your SRF Assistance Agreements. The figure reported in this section is not directly tied to an individual Assistance Agreement identification number. (SRF state recipients report state procurements in this section)

6. If there were no MBE/WBE accomplishments this reporting period, please briefly explain what

## XI - EPA Form 5700-52A MBE/WBE Utilization Reports

specific steps you are taking to achieve the MBE/WBE requirements specified in the terms and conditions of the Assistance Agreement.

7. Name and title of official administrator or designated reporting official.
8. Signature, month, day, and year report submitted.

### **D. Instructions for Part II:**

For each MBE/WBE procurement made under this assistance agreement during the reporting period, provide the following information:

1. Check whether this procurement was made by the recipient, sub-recipient/SRF loan recipient, or the prime contractor.
2. Check either the MBE or WBE column. If a firm is both an MBE and WBE, the recipient may choose to count the entire procurement towards EITHER its MBE or WBE accomplishments. The recipient may also divide the total amount of the procurement (using any ratio it so chooses) and count those divided amounts toward its MBE and WBE accomplishments. If the recipient chooses to divide the procurement amount and count portions toward its MBE and WBE accomplishments, please state the appropriate amounts under the MBE and WBE columns on the form. **The combined MBE and WBE amounts for that MBE/WBE contractor must not exceed the "Value of the Procurement" reported in column #3**
3. Dollar value of procurement.
4. Date of procurement, shown as month, day, year. Date of procurement is defined as the date the contract or procurement was awarded, **not** the date the contractor received payment under the awarded contract or procurement, unless payment occurred on the date of award. **(Where direct purchasing is the procurement method, the date of procurement is the date the purchase was made)**
5. Using codes at the bottom of the form, identify type of product or service acquired through this procurement (e.g., enter 1 if construction, 2 if supplies, etc).
6. Name, address, and telephone number of MBE/WBE firm.

--This data is requested to comply with provisions mandated by: statute or regulations (40 CFR Part 30, 31,

and 33); OMB Circulars; or added by EPA to ensure sound and effective assistance management. Accurate, complete data are required to obtain funding, while no pledge of confidentiality is provided.

The public reporting and recording burden for this collection of information is estimated to average 1 hour per response annually. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclosure or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, OPPE Regulatory Information Division, U.S. Environmental Protection Agency (2136), 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Include the OMB Control number in any correspondence. Do not send the completed form to this address.

## XII - Changes to Approved DBE Compliance Form

Loan Recipient: \_\_\_\_\_

SRF Loan Number: \_\_\_\_\_

### **CERTIFICATIONS:**

***I certify that the information submitted on and with this form is true and accurate and that this firm has met and will continue to meet the conditions of this construction contract regarding DBE solicitation and utilization. I further certify that criteria used in selecting subcontractors and suppliers were applied equally to all potential participants.***

\_\_\_\_\_  
(Prime Contractor signature)

Date \_\_\_\_\_

\_\_\_\_\_  
(Printed name and title)

***I certify that I have reviewed the information submitted on and with this form and that it meets the requirements of the Owner's State Revolving Fund loan contract.***

\_\_\_\_\_  
(Signature of Owner or Owner's representative)

Date \_\_\_\_\_

\_\_\_\_\_  
(Printed name and title)

### **GENERAL INFORMATION:**

- (1) If an approved subcontractor is terminated or replaced, please identify this company and briefly state reason.
  
- (2) For new or additional subcontractors, list name, trade, address, telephone number, contact person, dollar amount of subcontract, and DBE status.
  
- (3) Attach proof of certification by EPA, SBA, DOT (or by state, local, Tribal, or private entities whose certification criteria match EPA's) for each subcontractor listed as a DBE, MBE, or WBE.
- (4) Attach documentation of solicitation effort for prospective DBE firms, such as fax confirmation sheets, copies of solicitation letters/emails, printouts of the online solicitations, printouts of online search results, affidavits of publication in newspapers, etc. The prime contractor is strongly encouraged to follow up each solicitation with at least 1 logged phone call. Whenever possible, post solicitation for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
- (5) Provide justification for not selecting a certified DBE subcontractor that submitted a low bid for any subcontract area.

### XIII – Certification Regarding Equal Employment Opportunity

The contractor is required to comply with Executive Order 112-46 of September 24, 1965 entitled "Equal Employment Opportunity" as amended by Executive Order 11375 of October 13, 1967.

The contract for the work under this proposal will obligate the prime contractor and its subcontractors not to discriminate in employment practices.

The contractor shall not maintain or provide for his/her employees the facilities, which are segregated on a basis of race, creed, color or national origin, whether such facilities are segregated by directive or on a de facto basis.

The contractor must, if requested, submit a compliance report concerning their employment practices and policies in order to maintain his/her eligibility to receive the award of the contract.

The contractor must be prepared to comply in all respects with any contract provisions regarding non-discrimination stipulated in conjunction with labor standards.

#### CONTRACTOR'S CERTIFICATION:

Contractor's Name:

Address:

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1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause. Yes\_\_\_\_ No\_\_\_\_
2. Compliance Reports were required to be filed in connection with such contract or subcontract. Yes\_\_\_\_ No\_\_\_\_
3. Bidder has filed all compliance reports due under applicable contract requirements. Yes\_\_\_\_ No\_\_\_\_

If answer to item 3 is "No", please explain in detail on reverse side of this certification.

Certification - The information above is true and complete to the best of my knowledge and belief.

Signature of Authorized Official:

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Title:

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Date:

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#### XIV – Debarred Firms Certification

All prime construction contractors shall certify that Subcontracts have not and will not be awarded to any firm that is currently on the General Service Administration's Master List of Debarred, Suspended and Voluntarily Excluded Persons, in accordance with the provisions of ADEM Administrative Code 335-6-14-.35. Debarment action is taken against a firm for noncompliance with Federal Law.

All bidders shall complete this certification in duplicate and submit both copies to the owner with the bid proposal. The owner shall transmit one copy to ADEM within 14 days after the bid opening.

Project Name: \_\_\_\_\_

SRF Project No.: \_\_\_\_\_

The undersigned hereby certifies that the firm of \_\_\_\_\_  
\_\_\_\_\_ has not and will not award a subcontract, in connection with any contract awarded to it as the result of this bid, to any firm that is currently on the General Service Administration's Master List of Debarred, Suspended, and Voluntarily Excluded Persons.

Signature of Authorized Official: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

## XV – Davis-Bacon and Related Acts

### **Labor Standards Provisions for Federally Assisted Contracts**

#### **Wage Rate Requirements Under FY 2013 Continuing Appropriation**

##### **I. Requirements under the Consolidated and Further Continuing Appropriations Act. 2013 (P.L. 113-6) For Subrecipients That Are Governmental Entities:**

The following terms and conditions specify how recipients will assist EPA in meeting its Davis-Bacon (DB) responsibilities when DB applies to EPA awards of financial assistance under the FY 2013 Continuing Resolution with respect to State recipients and subrecipients that are governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient. If a State recipient needs guidance, the recipient may contact Cynthia Y. Edwards at [Edwards.Cynthiay@epa.gov](mailto:Edwards.Cynthiay@epa.gov) or at 404-562-9340 of EPA, Region 4 Grants and SRF Management Section, for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at <http://www.dol.gov/whd/>

##### **1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.**

Under the FY 2013 Continuing Resolution, DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

##### **2. Obtaining Wage Determinations.**

(a) Subrecipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) weekly to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from [www.wdol.gov](http://www.wdol.gov) into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

### **3. Contract Subcontract Provisions.**

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the FY 2010 appropriation, the following clauses:

#### **(1) Minimum wages.**

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, [www.dol.gov](http://www.dol.gov).

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

## **(2) Withholding.**

The subrecipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.



### **(3) Payrolls and basic records.**

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5(a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5(a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

#### **(4) Apprentices and trainees.**

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program.

If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

**(5) Compliance with Copeland Act requirements.**

The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

**(6) Subcontracts.**

The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

**(7) Contract termination: debarment.**

A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

**(8) Compliance with Davis-Bacon and Related Act requirements.**

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

**(9) Disputes concerning labor standards.**

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Subrecipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

**(10) Certification of eligibility.**

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

#### **4. Contract Provision for Contracts in Excess of \$100,000.**

(a) Contract Work Hours and Safety Standards Act. The subrecipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

##### **(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 (a)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), 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 (a)(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 (a)(1) of this section.

##### **(3) Withholding for unpaid wages and liquidated damages.**

The subrecipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall 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 prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime 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 (b)(2) of this section.

##### **(4) Subcontracts.**

The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

## 5. Compliance Verification

(a) The subrecipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The subrecipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, the subrecipient should conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information

indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The subrecipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the subrecipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Subrecipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the subrecipient shall verify evidence of fringe benefit plans and payments there under by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/esa/contacts/whd/america2.htm>.

***(Insert applicable wage rate determination here.)***

Wage Rates are county specific for *Heavy Construction* and can be found at:  
<http://www.gpo.gov/davisbacon/al.html> .

General Decision Number: AL190092 01/04/2019 AL92

Superseded General Decision Number: AL20180173

State: Alabama

Construction Type: Building

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories)

County: Mobile County in Alabama.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.60 for calendar year 2019 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.60 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2019. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Modification Number	Publication Date
0	01/04/2019

ASBE0078-001 09/26/2016

	Rates	Fringes
ASBESTOS WORKER/HEAT & FROST		
INSULATOR.....	\$ 26.13	12.92

BOIL0108-001 03/01/2018

	Rates	Fringes
BOILERMAKER.....	\$ 30.07	22.71

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 ELEC0505-002 09/01/2017

	Rates	Fringes
ELECTRICIAN.....	\$ 25.94	3%+8.01

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ENGI0653-017 10/01/2016

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Bulldozer.....	\$ 25.45	12.08
Crane.....	\$ 27.30	12.08

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\* PLUM0119-001 07/22/2018

	Rates	Fringes
PLUMBER.....	\$ 26.10	11.91

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SHEE0441-009 07/01/2017

	Rates	Fringes
SHEET METAL WORKER (Includes HVAC Duct Installation).....	\$ 21.00	12.78

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SUAL2015-020 08/02/2017

	Rates	Fringes
BRICKLAYER.....	\$ 19.81	0.00
CARPENTER, Includes Form Work....	\$ 18.16	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 16.00	0.00
IRONWORKER, REINFORCING.....	\$ 22.86	7.94
IRONWORKER, STRUCTURAL.....	\$ 19.73	1.15
LABORER: Common or General.....	\$ 11.94	0.00
LABORER: Mason Tender - Brick...	\$ 11.00	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 12.16	0.00
LABORER: Pipelayer.....	\$ 12.58	0.00
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 21.07	11.78
OPERATOR: Forklift.....	\$ 20.69	0.00
OPERATOR: Grader/Blade.....	\$ 17.52	0.89
OPERATOR: Loader.....	\$ 14.69	0.00



OPERATOR: Roller.....	\$ 14.00	1.78
PAINTER (Brush and Roller).....	\$ 15.41	0.00
PAINTER: Spray.....	\$ 14.31	0.00
PIPEFITTER.....	\$ 20.78	5.04
ROOFER.....	\$ 13.61	0.00
SPRINKLER FITTER (Fire Sprinklers).....	\$ 21.50	0.00
TILE SETTER.....	\$ 15.86	0.00
TRUCK DRIVER: Dump Truck.....	\$ 13.18	0.00

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WELDERS - Receive rate prescribed for craft performing  
operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

## WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION



## XVI – American Iron and Steel Requirement


**Section 4.13 Compliance with 2014 Appropriations Act.** (a) The Loan Recipient agrees to comply with all federal requirements applicable to the Authority Loan (including those imposed by P.L. 113-76, Consolidated Appropriations Act (the "2014 Appropriations Act") and related SRF Policy Guidelines) which the Loan Recipient understands includes, among other things, requirements that all of the iron and steel products used in the Project are to be produced in the United States ("American Iron and Steel") unless (i) the Loan Recipient has requested and obtained a waiver from the U.S. Environmental Protection Agency pertaining to the Project or (ii) the Authority has otherwise advised the Loan Recipient in writing that the Buy American Requirement is not applicable to the Project. .

(b) The Loan Recipient also agrees to comply with all recordkeeping and reporting requirements under the Clean Water Act (codified generally under 33 U.S.C. §1251 et seq.) (the "Clean Water Act"), including any reports required by a federal agency or the Authority such as performance indicators of program deliverables, information on costs and Project progress. The Loan Recipient understands that (i) each contract and subcontract related to the Project is subject to audit by appropriate federal and state entities, and (ii) failure to comply with the Clean Water Act and this Agreement may be an Event of Default hereunder that results in a repayment of the Authority Loan in advance of the maturity of the Evidence of Indebtedness and/or other remedial actions.

The Loan Recipient agrees to cause all contractors and subcontractors to comply with (through the inclusion of appropriate terms and conditions in all contracts, subcontracts and lower tiered transactions, such terms and conditions to be in substantially the form set forth in connection with the development and construction of the project


The Contractor acknowledges to and for the benefit of the \_\_\_\_\_, Alabama ("Purchaser"), and the Alabama Water Pollution Control Authority or the Drinking Water Finance Authority (the "State Authority") that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund that have statutory requirements commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel") including iron and steel products provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State Authority that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State Authority. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State Authority to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or State Authority resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State Authority or any damages owed to the State Authority by the Purchaser). While the Contractor has no direct contractual privity with the State Authority, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State Authority is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State Authority.

XVII – Project Sign Detail - CWSRF

<p style="text-align: center;"><b>STATE OF ALABAMA</b> Honorable (name), Governor</p> <p style="text-align: center;"><b>ALABAMA WATER POLLUTION CONTROL AUTHORITY</b> <b>POLLUTION CONTROL PROJECT</b></p> <p style="text-align: center;">(NAME OF OWNER) <b>(NAME OF PROJECT)</b></p> <p style="text-align: center;">\$(amount) STATE REVOLVING FUND LOAN</p> <p style="text-align: center;">(NAME OF CONTRACTOR) • CONTRACTOR (NAME OF ENGINEER) • CONSULTING ENGINEER</p> <p style="text-align: center;">ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT U.S. ENVIRONMENTAL PROTECTION AGENCY</p>	
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1. Sign is to be constructed of ½" MDO plywood, 4' x 8'.
2. Paint with two (2) coats oil-base enamel before lettering.
3. Background color white; lettering black.
4. Lettering may be painted or vinyl. All lettering sizes to be proportionate to sign layout.
5. Sign shall be attached to 4" x 4" x 8' treated posts.
6. Sign shall be placed in prominent location, easily readable from existing street or roadway.
7. Sign shall be maintained in good condition until completion of project.

XVIII – Project Sign Detail - DWSRF

<div><div><div>STATE OF ALABAMA</div><div>Honorable (Name), Governor</div><div>ALABAMA DRINKING WATER FINANCE AUTHORITY</div><div>INFRASTRUCTURE PROJECT</div><div>(NAME OF OWNER)</div><div><b>(NAME OF PROJECT)</b></div><div>\$(amount) STATE REVOLVING FUND LOAN</div><div>(NAME OF CONTRACTOR) • CONTRACTOR</div><div>(NAME OF ENGINEER) • CONSULTING ENGINEER</div><div>ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT</div><div>U.S. ENVIRONMENTAL PROTECTION AGENCY</div></div><div></div></div>
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1. Sign is to be constructed of ½" MDO plywood, 4' x 8'.
2. Paint with two (2) coats oil-base enamel before lettering.
3. Background color white; lettering black.
4. Lettering may be painted or vinyl. All lettering sizes to be proportionate to sign layout.
5. Sign shall be attached to 4" x 4" x 8' treated posts.
6. Sign shall be placed in prominent location, easily readable from existing street or roadway.
7. Sign shall be maintained in good condition until completion of project.

## XIX – Construction Contract Requirements

This checklist is to be completed by the Owner/Engineer when submitting plans and specifications to the SRF and Operator Certification Section for review. It affirms to the SRF reviewer that the Owner/Engineer has addressed these items (in boilerplate form) within the specifications manual.

Contract Page No.	Satisfied Yes/No	
_____	_____	Bid Advertisement (including date, time, and location of bid opening).
_____	_____	Bid Bond.
_____	_____	Performance Bond (100%).
_____	_____	Payment Bond (Not less than 50%).
_____	_____	Contract Length.
_____	_____	Liquidated Damages.
_____	_____	Liability Insurance (including workman's comp, public liability, and builder's risk, if applicable).
_____	_____	Method of Award (i.e. lowest, responsive, responsible bidder).
_____	_____	Air testing of gravity sewers (if applicable).

Within 14 days after bid opening, the Owner/Engineer is to prepare the Project Review and Cost Summary (**page SGC-37**) and submit it to the SRF and Operator Certification Section of ADEM. Upon completion of review, an Approval to Award will be issued.

**Note: The Owner assumes all financial risk if the construction contract is awarded prior to the issuance of an Approval to Award by the SRF and Operator Certification Section.**



## XX – Project Review and Cost Summary

<b>ADEM</b> Alabama Department of Environmental Management	<b>SRF Project Review and Cost Summary</b>	Form Revised 03 -10-10
<p>This form is to be completed and sent with supporting documentation to ADEM <u>within 14 days after bid opening</u>. Following review, an Approval to Award letter will be issued. Upon award of the contract, a complete, bound set of the contract documents should be forwarded to ADEM for review.</p> <p>Loan Applicant:_____ Project Number:_____</p> <p>Contract Number/Name:_____</p> <p>1. Date of plans and specifications concurrence letter from ADEM:_____</p> <p>Date of construction permit issuance from ADEM:_____</p> <p>2. Attach copies of the following documents:</p> <ul style="list-style-type: none"><li>a. Bid advertisement with certification by publisher and date(s) of publication.</li><li>b. Certified bid tabulation.</li><li>c. Proposal of the selected bidder.</li><li>d. Bid bond.</li><li>e. Engineer's letter to loan applicant recommending award of the contract. If the award is made to other than the low bidder, provide justification.</li><li>f. Site certificates for the project if not previously submitted with SRF loan application.</li><li>g. Documentation from the owner and contractor. The list of required documents can be found in Part III, page SGC-3 of the ADEM Supplemental General Conditions for SRF Assisted Public Drinking Water and Wastewater Facilities Construction Contracts (ADEM FORM 341).</li><li>h. Copy of the wage determination used in bidding.</li><li>i. Any addenda that have been issued after ADEM review of the plans and specifications.</li></ul> <p>Comments:</p>		



"General Decision Number: AL20210092 01/01/2021

Superseded General Decision Number: AL20200092

State: Alabama

Construction Type: Building

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories)

County: Mobile County in Alabama.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Modification Number	Publication Date
0	01/01/2021

\* ASBE0078-001 09/30/2019

Rates

Fringes

ASBESTOS WORKER/HEAT & FROST INSULATOR.....	\$ 27.50	14.10
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BOIL0108-001 03/01/2018

	Rates	Fringes
BOILERMAKER.....	\$ 30.07	22.71

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ELEC0505-002 09/01/2019

	Rates	Fringes
ELECTRICIAN.....	\$ 27.34	3%+8.61

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ENGI0653-017 10/01/2016

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Bulldozer.....	\$ 25.45	12.08
Crane.....	\$ 27.30	12.08

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\* PLUM0119-001 09/01/2020

	Rates	Fringes
PLUMBER.....	\$ 30.35	11.16

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SHEE0441-009 07/01/2017

	Rates	Fringes
SHEET METAL WORKER (Includes HVAC Duct Installation).....	\$ 21.00	12.78

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SUAL2015-020 08/02/2017

	Rates	Fringes
BRICKLAYER.....	\$ 19.81	0.00
CARPENTER, Includes Form Work....	\$ 18.16	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 16.00	0.00
IRONWORKER, REINFORCING.....	\$ 22.86	7.94
IRONWORKER, STRUCTURAL.....	\$ 19.73	1.15

LABORER: Common or General.....	\$ 11.94	0.00
LABORER: Mason Tender - Brick...	\$ 11.00	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 12.16	0.00
LABORER: Pipelayer.....	\$ 12.58	0.00
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 21.07	11.78
OPERATOR: Forklift.....	\$ 20.69	0.00
OPERATOR: Grader/Blade.....	\$ 17.52	0.89
OPERATOR: Loader.....	\$ 14.69	0.00
OPERATOR: Roller.....	\$ 14.00	1.78
PAINTER (Brush and Roller).....	\$ 15.41	0.00
PAINTER: Spray.....	\$ 14.31	0.00
PIPEFITTER.....	\$ 20.78	5.04
ROOFER.....	\$ 13.61	0.00
SPRINKLER FITTER (Fire Sprinklers).....	\$ 21.50	0.00
TILE SETTER.....	\$ 15.86	0.00
TRUCK DRIVER: Dump Truck.....	\$ 13.18	0.00

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WELDERS - Receive rate prescribed for craft performing  
operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their

own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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#### WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

"



"General Decision Number: AL20210110 01/01/2021

Superseded General Decision Number: AL20200110

State: Alabama

Construction Type: Heavy

County: Mobile County in Alabama.

HEAVY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.95 for calendar year 2021 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.95 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2021. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Modification Number	Publication Date
0	01/01/2021

ENGI0653-013 06/01/2017

	Rates	Fringes
POWER EQUIPMENT OPERATOR (PIPELINE)		
Backhoe, Excavator, Trackhoe.....	\$ 40.69	15.20
Bulldozer.....	\$ 40.69	15.20

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SUAL2015-038 08/02/2017

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 19.05	7.86
CEMENT MASON/CONCRETE FINISHER, Includes Water Sewer Lines.....	\$ 13.78	0.00
ELECTRICIAN.....	\$ 19.56	0.00
LABORER: Common or General, Includes Water Sewer Lines.....	\$ 15.21	6.16
LABORER: Pipelayer, Includes Water Sewer Lines.....	\$ 11.95	0.00
OPERATOR: Backhoe/Excavator/Trackhoe, Includes Water Sewer Lines (Excludes, PIPELINE).....	\$ 13.56	0.00
OPERATOR: Loader, Includes Water Sewer Lines.....	\$ 17.64	2.14
TRUCK DRIVER: Dump Truck, Includes Water Sewer Lines.....	\$ 12.56	2.12

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WELDERS - Receive rate prescribed for craft performing  
operation to which welding is incidental.

=====  
Note: Executive Order (EO) 13706, Establishing Paid Sick Leave  
for Federal Contractors applies to all contracts subject to the  
Davis-Bacon Act for which the contract is awarded (and any  
solicitation was issued) on or after January 1, 2017. If this

contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at [www.dol.gov/whd/govcontracts](http://www.dol.gov/whd/govcontracts).

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

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Union prevailing wage rates are updated to reflect all rate

changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

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Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
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With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
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U.S. Department of Labor  
200 Constitution Avenue, N.W.  
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2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

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Administrative Review Board  
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200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

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## **PART 2**

# **TECHNICAL SPECIFICATIONS**

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**SECTION 01 11 00  
SUMMARY OF WORK**

**PART 1      GENERAL**

**1.01      WORK COVERED BY CONTRACT DOCUMENTS**

- A.    The completed Work will provide Owner with a new Biosolids Dewatering System at the C. C. Williams WWTP along with other improvements all as generally enumerated as follows:
1.    A new Dewatering/Operations Building including the following:
    - a.    A single-story truck loading bay and a two-story process building.
    - b.    Three new and one relocated 2-meter BFPs, plus space allocations for two additional 2-meter BFPs.
    - c.    A polymer feed system including bulk polymer tanks, activation system, and polymer dosing pumps for the four initially installed BFPs.
    - d.    Space allocations for future thickeners prior to aerobic digestion.
    - e.    Space allocations for a future Class A biosolids production components.
    - f.    New operations control room and SCADA server room.
  2.    Sludge transfer pumps to feed the Dewatering Building with sludge from the Williams WWTP digestors.
  3.    A sludge receiving station, dosing tank, and feed pumps to accept and feed the Dewatering Building with sludge from the Smith WWTP.
  4.    Replacement chlorine and sulfur dioxide (SO<sub>2</sub>) feed/storage building and reconnected existing/relocated gas scrubber system.
  5.    Upgraded SCADA system hardware and software with a replacement fiber optic ring.
  6.    Replacement and supplemented security access control, security lighting, and video security system.
  7.    Replacement perimeter fence on the north side of the facility along with new entrance signage.
  8.    Demolished Operations Building, Chlorine Building, Sulfur Dioxide (SO<sub>2</sub>) Building, Dewatering Building, and the decommissioned primary clarifier structure.
  9.    Miscellaneous site/civil improvements to provide access to new facilities.

10. Work shall include the removal and disposal of non-friable asbestos and lead-containing materials in the Operations Building as identified in the herewith attached report titled CC Williams WWTP Asbestos and LBP Survey. Work shall be performed as a component of the building demolition in adherence to applicable regulations for such removal and disposal. TCLP testing has been performed as per the attached "CC Williams TCLP Report" and lead-containing demolition waste will not be considered a hazardous waste. Further testing for lead is not required. Disposal records for any other materials determined to be classified as hazardous must be submitted.

B. Alternates:

1. The Owner may accept or reject any additive alternate at its sole discretion irrespective of its acceptance of any other Additive Alternate except as indicated herein.
2. Additive Alternates No. 1, 2, 3, 4, 4A, 5, 6, 7, 8, and 9 that were selected by the Owner, as evidenced in the Agreement, are made a part of this Contract. The acceptance of any or all of these additive alternates will not be a basis for a change in the contract time.
3. Additive Alternate 4A may be conditionally accepted by the Owner at the time of the award if Additive Alternate 4 is accepted. Upon completion of Additive Alternate 4, Additive Alternate 4A may be deleted from the contract at the Owner's sole discretion. Additionally, upon completion of Additive Alternate 4, Additive Alternate 5 may be deleted from the contract at the Owner's sole discretion.
4. Either or both of Additive Alternates 10 and 11 may or may not be accepted by the Owner at any time at or after the award of the contract up to the initiation of the majority of the project's required pavement operations at the Owner's sole discretion. The quantities of either additive alternate is at the Owner's discretion without a change in the contract time or the unit price up to a quantity to encompass all of the existing paved areas of the facility. Unused or overages on quantities will be the basis of a change order modifying the Contract amount. The acceptance of these additive alternates will not be a basis for a change in the Contract time.
5. Alternates that were Bid were as described below:
  - a. Additive Alternate No. 1: Construction of Facility 50 - Chlorination and SO<sub>2</sub> Building – Includes the buildings complete with all indicated equipment and components, and associated paving and sidewalks complete in all respects inclusive of facility startup.

- b. Additive Alternate No. 2: Demolition of Facility 97 and 98 – Existing Chlorination and SO<sub>2</sub> Buildings - Includes complete demolition of the buildings and the intervening storage area inclusive of the lowest building slab along with the associated piping, paving and sidewalks. It includes the filling of the resulting excavations and associated grading and grassing all in accordance with the Drawings. This alternate will only be exercised if Additive Alternate 1 is accepted. Demolition shall include the removal and disposal of lead-containing material in the Chlorine Building as identified in the herewith attached report titled CC Williams WWTP Asbestos and LBP Survey. Work shall be performed as a component of the building demolition in adherence to applicable regulations for such removal and disposal. TCLP testing has been performed as per the attached “CC Williams TCLP Report” and lead-containing demolition waste will not be considered a hazardous waste. Further testing for lead is not required. Disposal records for any other materials determined to be classified as hazardous must be submitted.
- c. Additive Alternate No. 3: Demolition of Facility 84 – Existing Dewatering Building- Includes complete demolition of the building inclusive of the lowest building slab and pile caps (includes pile removal) along with the associated piping, paving and sidewalks. It includes the filling of the resulting excavations and associated grading and grassing. It includes the removal of the existing transformer, generator, and fuel tank and the installation of the road in the place of the existing building all in accordance with the Drawings.
- d. Additive Alternate No. 4: Limited demolition of the existing Secondary Digesters to include the removal and disposal of the existing brick veneer of the tanks in accordance with the Drawings.
- e. Additive Alternate No. 4A: Architectural modifications of the existing Secondary Digesters and attached building in accordance with the Drawings exclusive of the work of Additive Alternate 4.
- f. Additive Alternate No. 5: Architectural modifications of the existing Primary Digesters and attached building in accordance with the Drawings.
- g. Additive Alternate No. 6: Modifications of the existing Parking Area north of the Administration Building (Facility 93) along with the associated demolition, site grading and grassing, light pole relocation and other work as necessary to complete the modifications in accordance with the Drawings.

- h. Additive Alternate No. 7: Limited Replacement of the WWTP Fence to include the north perimeter fence exclusive of the replacement entry gate and fence in accordance with the Drawings.
  - i. Additive Alternate No. 8: Main Entry Sign to include the construction of the new entry sign in accordance with the Drawings.
  - j. Additive Alternate No. 9: Replacement of RTU-4 (DCU-4) PLC along with all accessory components, programming and startup services to provide a fully function replacement PLC in accordance with the Drawings.
  - k. Additive Alternate No. 10: Provide additional asphalt milling and overlay on a unit price basis as bid. Milling and overlay shall be of the areas as directed by the Owner and in accordance with the contract details for milling and overlay. Where exiting pavement striping is removed, replacement striping shall be considered incidental to the replacement unit price.
  - l. Additive Alternate No. 11: Provide asphalt replacement on a unit price basis as bid. Replacement shall be of the areas as directed by the Owner and in accordance with the specification requirements for asphalt patching. Where exiting pavement striping is removed, replacement striping shall be considered incidental to the replacement unit price.
6. A Contract time change is not associated with any of these alternates.

1.02 PROVISIONS FOR FUTURE WORK

- A. Provisions for future construction are shown on the Drawings.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01 26 00**  
**CONTRACT MODIFICATION PROCEDURES**

**PART 1      GENERAL**

**1.01      PROPOSAL REQUESTS**

- A. Owner may, in anticipation of ordering an addition, deletion, or revision to the Work, request Contractor to prepare a detailed proposal of cost and times to perform contemplated change.
- B. Proposal request will include reference number for tracking purposes and detailed description of and reason for proposed change, and such additional information as appropriate and as may be required for Contractor to accurately estimate cost and time impact on Project.
- C. Proposal request is for information only; Contractor is neither authorized to execute proposed change nor to stop Work in progress as result of such request.
- D. Contractor's written proposal shall be transmitted to Engineer promptly, but not later than 14 days after Contractor's receipt of Owner's written request. Proposal shall remain firm for a maximum period of 45 days after receipt by Engineer.
- E. Owner's request for proposal or Contractor's failure to submit such proposal within the required time period will not justify a Claim for an adjustment in Contract Price or Contract Times (or Milestones).

**1.02      CLAIMS**

- A. Include, at a minimum:
  - 1. Specific references including (i) Drawing numbers, (ii) Specification section and article/paragraph number, and (iii) Submittal type, Submittal number, date reviewed, Engineer's comment, as applicable, with appropriate attachments.
  - 2. Stipulated facts and pertinent documents, including photographs and statements.
  - 3. Interpretations relied upon.
  - 4. Description of (i) nature and extent of Claim, (ii) who or what caused the situation, (iii) impact to the Work and work of others, and (iv) discussion of claimant's justification for requesting a change to price or times or both.

5. Estimated adjustment in price claimant believes it is entitled to with full documentation and justification.
6. Requested Change in Contract Times: Include at least (i) Progress Schedule documentation showing logic diagram for request, (ii) documentation that float times available for Work have been used, and (iii) revised activity logic with durations including sub-network logic revisions, duration changes, and other interrelated schedule impacts, as appropriate.
7. Documentation as may be necessary as set forth below for Work Change Directive, and as Engineer may otherwise require.

### 1.03 WORK CHANGE DIRECTIVES

#### A. Procedures:

1. Engineer will:
  - a. Initiate, including a description of the Work involved and any attachments.
  - b. Affix signature, demonstrating Engineer's recommendation.
  - c. Transmit five copies to Owner for authorization.
2. Owner will:
  - a. Affix signature, demonstrating approval of the changes involved.
  - b. Return four copies to Engineer, who will retain one copy, send one copy to the Resident Project Representative or other field representative, and forward two copies to Contractor.
3. Upon completion of Work covered by the Work Change Directive or when final Contract Times and Contract Price are determined, Contractor shall submit documentation for inclusion in a Change Order.
4. Contractor's documentation shall include but not be limited to:
  - a. Appropriately detailed records of Work performed to enable determination of value of the Work.
  - b. Full information required to substantiate resulting change in Contract Times and Contract Price for Work. On request of Engineer, provide additional data necessary to support documentation.
  - c. Support data for Work performed on a unit price or Cost of the Work basis with additional information such as:
    - 1) Dates Work was performed, and by whom.
    - 2) Time records, wage rates paid, and equipment rental rates.
    - 3) Invoices and receipts for materials, equipment, and subcontracts, all similarly documented.

- B. Effective Date of Work Change Directive: Date of signature by Owner, unless otherwise indicated thereon.

## 1.04 CHANGE ORDERS

### A. Procedure:

1. Engineer will prepare six copies of proposed Change Order and transmit such with Engineer's written recommendation and request to Contractor for signature.
2. Contractor shall, upon receipt, either: (i) promptly sign copies, retaining one for its file, and return remaining five copies to Engineer for Owner's signature, or (ii) return unsigned five copies with written justification for not executing Change Order.
3. Engineer will, upon receipt of Contractor signed copies, promptly forward Engineer's written recommendation and partially executed five copies for Owner's signature, or if Contractor fails to execute the Change Order, Engineer will promptly so notify Owner and transmit Contractor's justification to Owner.
4. Upon receipt of Contractor-executed Change Order, Owner will promptly either:
  - a. Execute Change Order, retaining one copy for its file and returning four copies to Engineer; or
  - b. Return to Engineer unsigned copies with written justification for not executing Change Order.
5. Upon receipt of Owner-executed Change Order, Engineer will transmit two copies to Contractor, one copy to Resident Project Representative or other field representative, and retain one copy, or if Owner fails to execute the Change Order, Engineer will promptly so notify Contractor and transmit Owner's justification to Contractor.
6. Upon receipt of Owner-executed Change Order, Contractor shall:
  - a. Perform Work covered by Change Order.
  - b. Revise Schedule of Values to adjust Contract Price and submit with next Application for Payment.
  - c. Revise Progress Schedule to reflect changes in Contract Times, if any, and to adjust times for other items of Work affected by change.
  - d. Enter changes in Project record documents after completion of change related Work.

### B. In signing a Change Order, Owner and Contractor acknowledge and agree that:

1. Stipulated compensation (Contract Price or Contract Times, or both) set forth includes payment for (i) the Cost of the Work covered by the Change Order, (ii) Contractor's fee for overhead and profit, (iii) interruption of Progress Schedule, (iv) delay and impact, including cumulative impact, on other Work under the Contract Documents, and (v) extended overheads.

2. Change Order constitutes full mutual accord and satisfaction for the change to the Work.
3. Unless otherwise stated in the Change Order, all requirements of the original Contract Documents apply to the Work covered by the Change Order.

#### 1.05 COST OF THE WORK

- A. In determining the supplemental costs allowed, the following will apply.
- B. Rental of construction equipment and machinery and the parts thereof having a replacement value in excess of \$1,000, whether owned by Contractor or rented or leased from others, shall meet the following requirements:
  1. Full rental costs for leased equipment shall not exceed rates listed in the Rental Rate Blue Book published by Equipment Watch, as adjusted to the regional area of the Project. Owned equipment costs shall not exceed the single shift rates established in the Cost Reference Guide (CRG) published by Equipment Watch. The most recent published edition in effect at commencement of actual equipment use shall be used.
  2. Rates shall apply to equipment in good working condition. Equipment not in good condition, or larger than required, may be rejected by Engineer or accepted at reduced rates.
  3. Leased Equipment: For equipment leased or rented in arm's length transactions from outside vendors, maximum rates shall be determined by the following actual usage/Payment Category:
    - a. Less than 8 hours: Hourly rate.
    - b. 8 or more hours but less than 7 days: Daily rate.
    - c. 7 or more days but less than 30 days: Weekly rate.
    - d. 30 days or more: Monthly rate.
  4. Arm's length rental and lease transactions are those in which the firm involved in the rental or lease of equipment is not associated with, owned by, have common management, directorship, facilities and/or stockholders with the firm renting the equipment.
  5. Financial arrangements associated with rental and lease transactions that provide Contractor remuneration or discounts not visible to the Owner must be disclosed and integrated with charged rates.
  6. Leased Equipment in Use: Actual equipment use time documented by Engineer shall be the basis that equipment was on and utilized at the Project Site. In addition to the leasing rate above, equipment operational costs shall be paid at the estimated hourly operating cost rate set forth in the Rental Rate Blue Book if not already included in the lease rate. Hours of operation shall be based upon actual equipment usage to the nearest quarter hour, as recorded by Engineer.



7. Leased Equipment, When Idle (Standby): Idle or standby equipment is equipment onsite or in transit to and from the Work Site and necessary to perform the Work under the modification, but not in actual use. Idle equipment time, as documented by Engineer, shall be paid at the leasing rate determined above, excluding operational costs.
8. Owned and Other Equipment in Use: Equipment rates for owned equipment or equipment provided in other than arm's length transaction shall not exceed the single shift total hourly costs rate developed in accordance with the CRG and as modified herein for multiple shifts. This total hourly rate will be paid for each hour the equipment actually performs work. Hours of operation shall be based upon actual equipment usage as recorded by Engineer. This rate shall represent payment in full for Contractor's direct costs.
9. Owned and Other Equipment, When Idle (Standby): Equipment necessary to be onsite to perform the Work on single shift operations, but not utilized, shall be paid for at the ownership hourly expense rate developed in accordance with the CRG, provided its presence and necessity onsite has been documented by Engineer. Payment for idle time of portions of a normal workday, in conjunction with original contract Work, will not be allowed. In no event shall idle time claimed in a day for a particular piece of equipment exceed the normal Work or shift schedule established for the Project. It is agreed that this rate shall represent payment in full for Contractor's direct costs. When Engineer determines that the equipment is not needed to continuously remain at the Work Site, payment will be limited to actual hours in use.
10. Owned and Other Equipment, Multiple Shifts: For multiple shift operations, the CRG single shift total hourly costs rate shall apply to the operating equipment during the first shift. For subsequent shifts, up to two in a 24-hour day, operating rate shall be the sum of the total hourly CRG operating cost and 60 percent of the CRG ownership and overhaul expense. Payment for idle or standby time for second and third shifts shall be 20 percent of the CRG ownership and overhaul expense.
11. When necessary to obtain owned equipment from sources beyond the Project limits, the actual cost to transfer equipment to the Site and return it to its original location will be allowed as an additional item of expense. Move-in and move-out allowances will not be made for equipment brought to the Project if the equipment is also used on original Contract or related Work.
12. If the move-out destination is not to the original location, payment for move-out will not exceed payment for move-in.

13. If move is made by common carrier, the allowance will be the amount paid for the freight. If equipment is hauled with Contractor's own forces, rental will be allowed for the hauling unit plus the hauling unit operator's wage. If equipment is transferred under its own power, the rental will be 75 percent of the appropriate total hourly costs for the equipment, without attachments, plus the equipment operator's wage.
14. Charges for time utilized in servicing equipment to ready it for use prior to moving and similar charges will not be allowed.
15. When a breakdown occurs on any piece of owned equipment, payment shall cease for that equipment and any other owned equipment idled by the breakdown.
16. If any part of the Work is shut down by Owner, standby time will be paid during nonoperating hours if diversion of equipment to other Work is not practicable. Engineer reserves the right to cease standby time payment when an extended shutdown is anticipated.
17. If a rate has not been established in the CRG for owned equipment, Contractor may:
  - a. If approved by Engineer, use the rate of the most similar model found, considering such characteristics as manufacturer, capacity, horsepower, age, and fuel type, or
  - b. Request Equipment Watch to furnish a written response for a rate on the equipment, which shall be presented to Engineer for approval; or
  - c. Request Engineer to establish a rate.

**1.06 FIELD ORDER**

- A. Engineer will issue Field Orders, with three copies to Contractor.
- B. Effective date of the Field Order shall be the date of signature by Engineer, unless otherwise indicated thereon.
- C. Contractor shall acknowledge receipt by signing and returning one copy to Engineer.
- D. Field Orders will be incorporated into subsequent Change Orders, as a no-cost change to the Contract.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01 29 00  
PAYMENT PROCEDURES**

**PART 1      GENERAL**

**1.01      SUBMITTALS**

- A.    Informational Submittals:
  - 1.    Schedule of Values: Submit on Contractor's standard form.
  - 2.    Schedule of Estimated Progress Payments:
    - a.    Submit with initially acceptable Schedule of Values.
    - b.    Submit adjustments thereto with Application for Payment.
  - 3.    Application for Payment.
  - 4.    Final Application for Payment.

**1.02      SCHEDULE OF VALUES**

- A.    Prepare a separate Schedule of Values for each schedule of the Work under the Agreement.
- B.    Upon request of Engineer, provide documentation to support the accuracy of the Schedule of Values.
- C.    Unit Price Work: Reflect unit price quantity and price breakdown from conformed Bid Form.
- D.    Lump Sum Work:
  - 1.    List bonds and insurance premiums, mobilization, demobilization, preliminary and detailed progress schedule preparation, equipment testing, facility startup, and contract closeout separately.
    - a.    Mobilization includes, at minimum, items identified in Section 01 50 00, Temporary Facilities and Controls.
    - b.    Include item(s) for monthly progress schedule update and maintenance of Engineer's trailer.
  - 2.    Break down by Division 2 through 49 with appropriate subdivision of each specification for each Project facility.
- E.    An unbalanced or front-end loaded schedule will not be acceptable.
- F.    Summation of the complete Schedule of Values representing all the Work shall equal the Contract Price.
- G.    Submit Schedule of Values on a CD in a spreadsheet format compatible with latest version of MSExcel.

1.03 SCHEDULE OF ESTIMATED PROGRESS PAYMENTS

- A. Show estimated payment requests throughout Contract Times aggregating initial Contract Price.
- B. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract Price as reflected by modifications to the Contract Documents.

1.04 APPLICATION FOR PAYMENT

- A. Transmittal Summary Form: Attach one Summary Form with each detailed Application for Payment for each schedule and include Request for Payment of Materials and Equipment on Hand as applicable. Execute certification by authorized officer of Contractor.
- B. Use detailed Application for Payment Form suitable to Owner.
- C. Provide separate form for each schedule as applicable.
- D. Include accepted Schedule of Values for each schedule or portion of lump sum Work.
- E. Include separate line item for each Change Order and Work Change Directive executed prior to date of submission. Provide further breakdown of such as requested by Engineer.
- F. Preparation:
  - 1. Round values to nearest dollar.
  - 2. Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form(s) for each schedule as applicable, a listing of materials on hand for each schedule as applicable, and such supporting data as may be requested by Engineer.

1.05 PAYMENT

- A. Payment for all Lump Sum Work shown or specified in Contract Documents is included in the Contract Price. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
- B. Payment for Lump Sum Work covers all Work specified or shown within the limits or Specification sections.

1.06 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

A. Payment will not be made for following:

1. Loading, hauling, and disposing of rejected material.
2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
4. Material not unloaded from transporting vehicle.
5. Defective Work not accepted by Owner.
6. Material remaining on hand after completion of Work.

1.07 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless Shop Drawings and preliminary operation and maintenance data is acceptable to Engineer.
- B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



**SECTION 01 31 13  
PROJECT COORDINATION**

**PART 1      GENERAL**

**1.01      SUBMITTALS**

**A.      Informational:**

1.      Statement of Qualification (SOQ) for land surveyor or civil engineer.
2.      Photographs:
  - a.      Digital Images: Submit two copies of DVD disc containing images within 5 days of being taken. Each image is to have a minimum file size of 1.4 Mb (1,400 Kb) so viewed resolution is high quality. The production of larger file sizes with higher resolution is encouraged.
3.      Video Recordings: Submit two copies within 5 days of being taken.
4.      Construction Sequencing and Bypass Pumping. See Section 01 57 28, Temporary Flow Control.

**1.02      RELATED WORK AT SITE**

**A.      General:**

1.      Other work that is either directly or indirectly related to scheduled performance of the Work under these Contract Documents, listed henceforth, is anticipated to be performed at Site by others.
2.      Coordinate the Work of these Contract Documents with work of others as specified in General Conditions.
3.      Include sequencing constraints specified herein as a part of Progress Schedule.

**1.03      UTILITY NOTIFICATION AND COORDINATION**

- A.      Coordinate the Work with various utilities within Project limits. Notify applicable utilities prior to commencing Work, if damage occurs, or if conflicts or emergencies arise during the Work.**

**1.04      PROJECT MILESTONES**

- A.      General: Include the Milestones specified herein as a part of the Progress Schedule required under Section 01 32 00, Construction Progress Documentation.**

## 1.05 WORK SEQUENCING/CONSTRAINTS

### A. Include the following Work sequences in the Progress Schedule:

1. Continuous unobstructed operation of the C. C. Williams WWTP is required. This may require the addition of temporary bypass pumping of process flows and plant sewer flows as specified in Section 01 57 28, Temporary Flow Control.
2. Provide temporary plugs or caps on interconnecting piping as needed to maintain the indicated existing facilities in service and to preclude the entry of wastewater or process flows into new facilities prior to their acceptance.
3. The existing 13.2KV overhead line to the existing Blower Building shall be demolished in order to provide the space required to construct the new Dewatering Building. The extended overhead 13.2KV line required to repower to the existing Blower Building must be completed and fully operational before the Contractor can commence any construction associated with the new Dewatering Building.
4. The existing Maintenance Building, Secondary Digester Building, and Sludge Heating Building are all currently fed from the existing electrical equipment located within the existing Blower Building. The existing feeders for these facilities are currently located such that they will need to be relocated in order to construct the new Dewatering Building. Therefore, the new feeders for the existing Maintenance Building, Secondary Digester Building, and the Sludge Heating Building must be installed and energized before the Contractor can commence any construction of the new Dewatering Building. These existing facilities will be repowered from the existing Headworks Electrical Building. Refer to the Drawings for routing of the new feeders required.
5. An existing flow meter (FIT-600A) is currently located within the existing Secondary Clarifier Electrical Building. The existing flow meter must be relocated to the existing Sludge Heating Building, as shown on the Drawings, before the Contractor can commence any demolition of the existing Secondary Clarifier Electrical Building.
6. A new PAC control panel (82-CP-1) shall be installed within the existing Blower Building. The new PAC panel shall be installed and fully operational, with all I/O integrated into the new PAC, before the Contractor can commence any demolition associated with the existing Operations Building.



7. Several new fiber optic cables, and associated conduit and manholes/handholes, must be installed in order to maintain the existing plant control system prior to the demolition of any existing facilities or relocation of any equipment from the existing Operations Building to the Maintenance Building. These new fiber optic cables include the following:
  - a. New fiber optic cable (aerial, single-mode) to be connected to the existing Administration Building communication/electrical room equipment in order to maintain connectivity to external systems and to the internet. This cable, installation, connections, and related equipment configuration will be provided by MAWSS. Refer to the Drawings for location and routing of this fiber optic cable.
  - b. New fiber optic cable from the Administration Building communication/network equipment to the existing Maintenance Building. This fiber extends the MAWSS business network and external interface connectivity to the Maintenance Building. Refer to the Drawings for location and routing of this fiber optic cable.
  - c. New fiber optic cable from the existing Maintenance Building to new PAC control panel 82-CP-1 located within the Blower Building. This fiber is temporary for maintaining the SCADA network during construction. Refer to the Drawings for location and routing of this fiber optic cable.
  - d. New fiber optic cable from the existing Maintenance Building to existing Secondary Digester Building RTU-3 control panel. This fiber is temporary for maintaining the SCADA network during construction. Refer to the Drawings for location and routing of this fiber optic cable.
  - e. New fiber optic cable from the existing Secondary Digester Building to the existing Headworks Electrical Building. This fiber will ultimately become part of the permanent SCADA control network. Refer to the Drawings for location and routing of this fiber optic cable.
  - f. New fiber optic cable from the existing Headworks Electrical Building to the existing Final Clarifiers Electrical Building. This fiber will ultimately become part of the permanent SCADA control network. Refer to the Drawings for location and routing of this fiber optic cable.

8. The existing plant Supervisory Control and Data Acquisition (SCADA) system shall remain fully functional during demolition of the existing Operations Building Control Room and during construction of the new Dewatering Building Control Room. Supporting tasks include (but are not limited to) the following:
  - a. Relocation of MAWSS incoming fiber optic connectivity for maintaining interfaces to external systems.
  - b. Installation of the temporary fiber optic control network.
  - c. Installation of new control panel 82-CP-1 in the Blower Building. This work includes moving active control signals from existing RTU-1 (to be demolished) to the new 82-CP-1 panel. Conversion of data points within the SCADA application is also required.
  - d. Relocation of existing SCADA computers and networking equipment to the temporary control room in the existing Maintenance Building. Once SCADA system is proven fully functional in the temporary control room environment, demolition of the Operations Building control room may commence.
  - e. Once the control room in the new Dewatering Building is completed and the final fiber optic control network is functional, the new SCADA system may be installed.
  - f. Both the existing SCADA system (Wonderware Archestra) and the new SCADA system (VTScada) will operate in parallel for a period of time to together control the plant.
  - g. The new programmable automation controller (PAC) control panel 20-CP-1 will be installed in the Dewatering Building and will house redundant PAC processors. The program in 20-CP-1 will control various aspects of the dewatering process as well as converted functionality from existing PAC controllers which are being converted during the course of this Project.
  - h. If Additive Alternate 1 is taken, the new Chlorine Building control panel 50-CP-1 shall be integrated into the program for 20-CP-1 and into the new SCADA system.
  - i. The new SCADA system will be connected to new vendor control panels as shown on the Drawings.
  - j. As existing PAC control panels are converted from Emerson Bristol hardware to new Allen-Bradley hardware, those signals will be migrated to the new SCADA system and removed from the existing SCADA system.
    - 1) If Additive Alternate 9 is not taken, then the existing Emerson Bristol PAC (RTU-4) in the Headworks Building will not be converted. In this scenario, RTU-4 shall be migrated to the new SCADA system.

- k. Existing vendor control panels shall be migrated to the new SCADA system.
- l. At the completion of all software conversions and migrations, the new VTScada software system will contain all in-plant operational controls. The existing SCADA system will only contain interfaces to external systems to provide information for the Smith plant and the Lift Stations. A legacy SCADA computer will be installed in the new control room to support those systems until they are upgraded in the future.

#### 1.06 FACILITY OPERATIONS

- A. Continuous operation of Owner's facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified.
- B. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of Owner's operations.
- C. When necessary, plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items to maintain continuous operations of Owner's facility.
- D. Do not close lines, open or close valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after authorization by Owner and Engineer. Such authorization will be considered within 48 hours after receipt of Contractor's written request.
- E. Process or Facility Shutdown:
  - 1. The existing and/or proposed facilities may only be shut down after approval, installation and activation of bypass pumping facilities such that normal flow is maintained into and through the C. C. Williams WWTP.
  - 2. Provide 48 hours advance written request for approval of need to shut down a process or facility to Owner and Engineer.
  - 3. Power outages will be considered upon 48 hours written request to Owner and Engineer. Describe the reason, anticipated length of time, and areas affected by the outage. Provide temporary provisions for continuous power supply to critical facility components.

- F. Install and maintain bypass facilities and temporary connections required to keep Owner's operations on line. Sequences other than those specified will be considered upon written request to Owner and Engineer, provided they afford equivalent continuity of operations.
- G. Do not proceed with Work affecting a facility's operation without obtaining Owner's and Engineer's advance approval of the need for and duration of such Work.
- H. Relocation of Existing Facilities:
  - 1. During construction, it is expected that minor relocations of Work will be necessary.
  - 2. Provide complete relocation of existing structures and Underground Facilities, including piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, and other necessary items.
  - 3. Use only new materials for relocated facility. Match materials of existing facility, unless otherwise shown or specified.
  - 4. Perform relocations to minimize downtime of existing facilities.
  - 5. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by Engineer.

#### 1.07 ADJACENT FACILITIES AND PROPERTIES

- A. Examination:
  - 1. After Effective Date of the Agreement and before Work at Site is started, Contractor, Engineer, and affected property owners and utility owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations.
  - 2. Periodic reexamination shall be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.
- B. Documentation:
  - 1. Record and submit documentation of observations made on examination inspections in accordance with Article Construction Photographs and Article Audio-Video Recordings.
  - 2. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's operations, and is for the protection of adjacent property owners, Contractor, and Owner.

## 1.08 CONSTRUCTION PHOTOGRAPHS

### A. General:

1. Photographically document all phases of the Project including preconstruction, construction progress, and post-construction.
2. Engineer shall have right to select subject matter and vantage point from which photographs are to be taken.
3. Digital Images: No post-session electronic editing of images is allowed. Stored image shall be actual image as captured without cropping or other edits.

### B. Preconstruction and Post-Construction:

1. After Effective Date of the Agreement and before Work at Site is started, and again upon issuance of Substantial Completion, take a minimum of 48 photographs of Site and property adjacent to perimeter of Site.
2. Particular emphasis shall be directed to structures both inside and outside the Site.
3. Format: Digital, minimum resolution of 1680 by 2240 pixels and 24-bit, millions of color.

### C. Construction Progress Photos:

1. Photographically demonstrate progress of construction, showing every aspect of Site and adjacent properties as well as interior and exterior of new or impacted structures.
2. Weekly: Take 48 photographs using digital, minimum resolution of 1680 by 2240 pixels and 24-bit, millions of color.
3. Monthly: Take 50 photographs using digital, minimum resolution of 1680 by 2240 pixels and 24-bit, millions of color.

### D. Documentation:

1. Digital Images:
  - a. Electronic image shall have date taken embedded into image.
  - b. Archive using a commercially available photo management system that provides listing of photographs including date, keyword description, and direction of photograph.
  - c. Label each disk with Project and Owner's name, week, month, and year images were produced.

## 1.09 AUDIO-VIDEO RECORDINGS

- A. Prior to beginning the Work on Site or of a particular area of the Work, and again within 10 days following date of Substantial Completion, videograph Site and property adjacent to Site.
- B. In the case of preconstruction recording, no work shall begin in the area prior to Engineer's review and approval of content and quality of video for that area.
- C. Particular emphasis shall be directed to physical condition of existing vegetation, structures, and pavements within and areas adjacent to and within the right-of-way or easement, and on Contractor storage and staging areas.
- D. Engineer shall have right to select subject matter and vantage point from which videos are to be taken.
- E. Video Format and Quality:
  - 1. DVD format, with sound.
  - 2. Video:
    - a. Produce bright, sharp, and clear images with accurate colors, free of distortion and other forms of picture imperfections.
    - b. Electronically, and accurately display the month, day, year, and time of day of the recording.
  - 3. Audio:
    - a. Audio documentation shall be done clearly, precisely, and at a moderate pace.
    - b. Indicate date, project name, and a brief description of the location of recording, including:
      - 1) Facility name.
      - 2) Street names or easements.
      - 3) Addresses of private property.
      - 4) Direction of coverage, including engineering stationing, if applicable.
- F. Documentation:
  - 1. DVD Label:
    - a. DVD number (numbered sequentially, beginning with 001).
    - b. Project name.
    - c. Date and time of coverage.
  - 2. Project Video Log: Maintain an ongoing log that incorporates above noted label information for DVDs on Project.

## 1.10 REFERENCE POINTS AND SURVEYS

- A. Location and elevation of benchmarks are shown on Drawings.
- B. Contractor's Responsibilities:
  - 1. Provide additional survey and layout required to layout the Work.
  - 2. Check and establish exact location of existing facilities prior to construction of new facilities and any connections thereto.
  - 3. In event of discrepancy in data provided by Owner, request clarification before proceeding with Work.
  - 4. Retain professional land surveyor or civil engineer registered in state of Alabama who shall perform or supervise engineering surveying necessary for additional construction staking and layout.
  - 5. Maintain complete accurate log of survey work as it progresses as a Record Document.
  - 6. On request of Engineer, submit documentation.
  - 7. Provide competent employee(s), tools, stakes, and other equipment and materials as Engineer may require to check layout, survey, and measurement work performed by others.

## **PART 2 PRODUCTS (NOT USED)**

## **PART 3 EXECUTION**

### 3.01 CUTTING, FITTING, AND PATCHING

- A. Cut, fit, adjust, or patch Work and work of others, including excavation and backfill as required, to make Work complete.
- B. Obtain prior written authorization of Engineer and Owner before commencing Work to cut or otherwise alter:
  - 1. Structural or reinforcing steel, structural column or beam, elevated slab, trusses, or other structural member.
  - 2. Weather-resistant or moisture-resistant elements.
  - 3. Efficiency, maintenance, or safety of element.
  - 4. Work of others.
- C. Refinish surfaces to provide an even finish.
  - 1. Refinish continuous surfaces to nearest intersection.
  - 2. Refinish entire assemblies.
  - 3. Finish restored surfaces to such planes, shapes, and textures that no transition between existing work and the Work is evident in finished surfaces.

- D. Restore existing work, Underground Facilities, and surfaces that are to remain in completed Work including concrete-embedded piping, conduit, and other utilities as specified and as shown on Drawings.
- E. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use recommended practice of manufacturer or appropriate trade association.
- F. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.
- G. Remove specimens of installed Work for testing when requested by Engineer.

**END OF SECTION**



**SECTION 01 31 19  
PROJECT MEETINGS**

**PART 1      GENERAL**

**1.01      GENERAL**

- A.    Engineer will schedule physical arrangements for meetings throughout progress of the Work, prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes within 5 days after each meeting to participants and parties affected by meeting decisions.

**1.02      PRECONSTRUCTION CONFERENCE**

- A.    Contractor shall be prepared to discuss the following subjects, as a minimum:
  - 1.    Required schedules.
  - 2.    Status of Bonds and insurance.
  - 3.    Sequencing of critical path work items.
  - 4.    Progress payment procedures.
  - 5.    Project changes and clarification procedures.
  - 6.    Use of Site, access, office and storage areas, security and temporary facilities.
  - 7.    Major product delivery and priorities.
  - 8.    Contractor's safety plan and representative.
- B.    Attendees will include:
  - 1.    Owner's representatives.
  - 2.    Contractor's office representative.
  - 3.    Contractor's resident superintendent.
  - 4.    Contractor's quality control representative.
  - 5.    Subcontractors' representatives whom Contractor may desire or Engineer may request to attend.
  - 6.    Engineer's representatives.
  - 7.    Others as appropriate.

**1.03      PRELIMINARY SCHEDULES REVIEW MEETING**

- A.    As set forth in General Conditions and Section 01 32 00, Construction Progress Documentation.

1.04 PROGRESS MEETINGS

- A. Engineer will schedule regular progress meetings at Site, conducted monthly to review the Work progress, Progress Schedule, Schedule of Submittals, Application for Payment, contract modifications, and other matters needing discussion and resolution.
- B. Attendees will include:
  - 1. Owner's representative(s), as appropriate.
  - 2. Contractor, Subcontractors, and Suppliers, as appropriate.
  - 3. Engineer's representative(s).
  - 4. Others as appropriate.

1.05 QUALITY CONTROL MEETINGS

- A. In accordance with Section 01 45 16.13, Contractor Quality Control.
- B. Scheduled by Engineer on regular basis and as necessary to review test and inspection reports, and other matters relating to quality control of the Work and work of other Contractors.
- C. Attendees will include:
  - 1. Contractor.
  - 2. Contractor's designated quality control representative.
  - 3. Subcontractors and Suppliers, as necessary.
  - 4. Engineer's representatives.

1.06 PROCESS INSTRUMENTATION AND CONTROL SYSTEMS (PICS)  
COORDINATION MEETINGS

- A. Engineer will schedule up to three meetings at Site, conducted to review specific requirements of PICS work.
- B. Attendees will include:
  - 1. Contractor.
  - 2. Owner.
  - 3. PICS Subcontractor/Installer.
  - 4. Engineer's representatives.

1.07 PREINSTALLATION MEETINGS

- A. When required in individual Specification sections, convene at Site prior to commencing the Work of that section.
- B. Require attendance of entities directly affecting, or affected by, the Work of that section.
- C. Notify Engineer 4 days in advance of meeting date.
- D. Provide suggested agenda to Engineer to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

1.08 FACILITY STARTUP MEETINGS

- A. Schedule and attend a minimum of three facility startup meetings. The first of such meetings shall be held prior to submitting Facility Startup Plan, as specified in Section 01 91 14, Equipment Testing and Facility Startup, and shall include preliminary discussions regarding such plan.
- B. Agenda items shall include, but not be limited to, content of Facility Startup Plan, coordination needed between various parties in attendance, and potential problems associated with startup.
- C. Attendees will include:
  - 1. Contractor.
  - 2. Contractor's designated quality control representative.
  - 3. Subcontractors and equipment manufacturer's representatives whom Contractor deems to be directly involved in facility startup.
  - 4. Engineer's representatives.
  - 5. Owner's operations personnel.
  - 6. Others as required by Contract Documents or as deemed necessary by Contractor.

1.09 OTHER MEETINGS

- A. In accordance with Contract Documents and as may be required by Owner and Engineer.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



**SECTION 01 32 00  
CONSTRUCTION PROGRESS DOCUMENTATION**

**PART 1      GENERAL**

**1.01      SUBMITTALS**

**A.      Informational Submittals:**

1. Preliminary Progress Schedule: Submit at least 7 days prior to preconstruction conference.
2. Detailed Progress Schedule:
  - a. Submit initial Detailed Progress Schedule in accordance with General Conditions.
  - b. Submit an Updated Progress Schedule at each update, in accordance with Article Detailed Progress Schedule.
3. Submit with Each Progress Schedule Submission:
  - a. Contractor's certification that Progress Schedule submission is actual schedule being used for execution of the Work.
  - b. Electronic file compatible with latest version of Microsoft Project, unless otherwise approved by Engineer.
  - c. Progress Schedule: Four legible copies.
  - d. Narrative Progress Report: Same number of copies as specified for Progress Schedule.

**1.02      PRELIMINARY PROGRESS SCHEDULE**

- A.** In addition to basic requirements outlined in General Conditions, show a detailed schedule, beginning with Notice to Proceed, for minimum duration of 90 days, and a summary of balance of Project through Final Completion.
- B.** Show activities including, but not limited to the following:
1. Notice to Proceed.
  2. Permits.
  3. Submittals, with review time. Contractor may use Schedule of Submittals specified in Section 01 33 00, Submittal Procedures.
  4. Early procurement activities for long lead equipment and materials.
  5. Initial Site work.
  6. Earthwork.
  7. Specified Work sequences and construction constraints.
  8. Contract Milestone and Completion Dates.
  9. Owner-furnished products delivery dates or ranges of dates.

10. Major structural, mechanical, equipment, electrical, architectural, and instrumentation and control Work.
  11. System startup summary.
  12. Project close-out summary.
  13. Demobilization summary.
- C. Update Preliminary Progress Schedule monthly as part of progress payment process. Failure to do so may result in the Owner withholding all or part of the monthly progress payment until the Preliminary Progress Schedule is updated in a manner acceptable to Engineer.
- D. Format: In accordance with Article Progress Schedule—Bar Chart.

#### 1.03 DETAILED PROGRESS SCHEDULE

- A. In addition to requirements of General Conditions, submit Detailed Progress Schedule beginning with Notice to Proceed and continuing through Final Completion.
- B. Show the duration and sequences of activities required for complete performance of the Work reflecting means and methods chosen by Contractor.
- C. When accepted by Engineer, Detailed Progress Schedule will replace Preliminary Progress Schedule and become Baseline Schedule. Subsequent revisions will be considered as Updated Progress Schedules.
- D. Format: In accordance with Article Progress Schedule—Bar Chart.
- E. Update monthly to reflect actual progress and occurrences to date, including weather delays.

#### 1.04 PROGRESS SCHEDULE—BAR CHART

- A. General: Comprehensive bar chart schedule, generally as outlined in Associated General Contractors of America (AGC) 580, “Construction Project Planning and Scheduling Guidelines.” If a conflict occurs between the AGC publication and this specification, this specification shall govern.
- B. Format:
1. Unless otherwise approved, white paper, 11-inch by 17-inch sheet size.
  2. Title Block: Show name of Project and Owner, date submitted, revision or update number, and name of scheduler.
  3. Identify horizontally, across the top of the schedule, the time frame by year, month, and day.

4. Identify each activity with a unique number and a brief description of the Work associated with that activity.
  5. Legend: Describe standard and special symbols used.
- C. Contents: Identify, in chronological order, those activities reasonably required to complete the Work, including as applicable, but not limited to:
1. Obtaining permits, submittals for early product procurement, and long lead time items.
  2. Mobilization and other preliminary activities.
  3. Initial Site work.
  4. Specified Work sequences, constraints, and Milestones, including Substantial Completion date(s).
  5. Subcontract Work.
  6. Major equipment design, fabrication, factory testing, and delivery dates.
  7. Delivery dates for Owner-furnished products, as specified in Section 01 11 00, Summary of Work.
  8. Sitework.
  9. Concrete Work.
  10. Structural steel Work.
  11. Architectural features Work.
  12. Conveying systems Work.
  13. Equipment Work.
  14. Mechanical Work.
  15. Electrical Work.
  16. Instrumentation and control Work.
  17. Interfaces with Owner-furnished equipment.
  18. Other important Work for each major facility.
  19. Equipment and system startup and test activities.
  20. Project closeout and cleanup.
  21. Demobilization.

#### 1.05 PROGRESS OF THE WORK

- A. Updated Progress Schedule shall reflect:
1. Progress of Work to within 5 working days prior to submission.
  2. Approved changes in Work scope and activities modified since submission.
  3. Delays in Submittals or resubmittals, deliveries, or Work.
  4. Adjusted or modified sequences of Work.
  5. Other identifiable changes.
  6. Revised projections of progress and completion.
  7. Report of changed logic.

- B. Produce detailed sub-schedules during Project, upon request of Owner or Engineer, to further define critical portions of the Work such as facility shutdowns.
- C. If an activity is not completed by its latest scheduled completion date and this failure is anticipated to extend Contract Times (or Milestones), submit, within 7 days of such failure, a written statement as to how nonperformance will be corrected to return Project to acceptable current Progress Schedule. Actions by Contractor to complete the Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.
- D. Owner may order Contractor to increase plant, equipment, labor force, or working hours if Contractor fails to:
  - 1. Complete a Milestone activity by its completion date.
  - 2. Satisfactorily execute Work as necessary to prevent delay to overall completion of Project, at no additional cost to Owner.

#### 1.06 SCHEDULE ACCEPTANCE

- A. Engineer's acceptance will demonstrate agreement that:
  - 1. Proposed schedule is accepted with respect to:
    - a. Contract Times, including Final Completion and all intermediate Milestones, are within the specified times.
    - b. Specified Work sequences and constraints are shown as specified.
    - c. Specified Owner-furnished Equipment or Material arrival dates, or range of dates, are included.
    - d. Access restrictions are accurately reflected.
    - e. Startup and testing times are as specified.
    - f. Submittal review times are as specified.
    - g. Startup testing duration is as specified and timing is acceptable.
  - 2. In all other respects, Engineer's acceptance of Contractor's schedule indicates that, in Engineer's judgment, schedule represents reasonable plan for constructing Project in accordance with the Contract Documents. Engineer's review will not make any change in Contract requirements. Lack of comment on any aspect of schedule that is not in accordance with the Contract Documents will not thereby indicate acceptance of that change, unless Contractor has explicitly called the nonconformance to Engineer's attention in submittal. Schedule remains Contractor's responsibility and Contractor retains responsibility for performing all activities, for activity durations, and for activity sequences required to construct Project in accordance with the Contract Documents.



B. Unacceptable Preliminary Progress Schedule:

1. Make requested corrections; resubmit within 10 days.
2. Until acceptable to Engineer as Baseline Progress Schedule, continue review and revision process, including updating schedule on a monthly basis to reflect actual progress and occurrences to date.

C. Unacceptable Detailed Progress Schedule:

1. Make requested corrections; resubmit within 10 days.
2. Until acceptable to Engineer as Baseline Progress Schedule, continue review and revision process.

1.07 ADJUSTMENT OF CONTRACT TIMES

A. Reference General Conditions and Section 01 26 00, Contract Modification Procedures.

B. Evaluation and reconciliation of Adjustments of Contract Times shall be based on the Updated Progress Schedule at the time of proposed adjustment or claimed delay.

C. Schedule Contingency:

1. Contingency, when used in the context of the Progress Schedule, is time between Contractor's proposed Completion Time and Contract Completion Time.
2. Contingency included in Progress Schedule is a Project resource available to both Contractor and Owner to meet Contract Milestones and Contract Times. Use of Schedule contingency shall be shared to the proportionate benefit of both parties.
3. Use of schedule contingency suppression techniques such as preferential sequencing and extended activity times is prohibited.
4. Pursuant to Contingency sharing provisions of this specification, no time extensions will be granted, nor will delay damages be paid until a delay occurs which (i) consumes all available contingency time, and (ii) extends Work beyond the Contract Completion date.

D. Claims Based on Contract Times:

1. Where Engineer has not yet rendered formal decision on Contractor's Claim for adjustment of Contract Times, and parties are unable to agree as to amount of adjustment to be reflected in Progress Schedule, reflect an interim adjustment in the Progress Schedule as acceptable to Engineer.

2. It is understood and agreed that such interim acceptance will not be binding on either Contractor or Owner, and will be made only for the purpose of continuing to schedule Work until such time as formal decision has been rendered as to an adjustment, if any, of the Contract Times.
3. Revise Progress Schedule prepared thereafter in accordance with Engineer's formal decision.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01 33 00  
SUBMITTAL PROCEDURES**

**PART 1      GENERAL**

**1.01      DEFINITIONS**

- A.    Action Submittal: Written and graphic information submitted by Contractor that requires Engineer's approval.
- B.    Deferred Submittal: Information submitted by Contractor for portions of design that are to be submitted to permitting agency for approval prior to installation of that portion of the Work, along with Engineer's review documentation that submittal has been found to be in general conformance with Project's design.
- C.    Informational Submittal: Information submitted by Contractor that requires Engineer's review and determination that submitted information is in accordance with the Conditions of the Contract.

**1.02      PROCEDURES**

- A.    Direct submittals to Engineer at the following, unless specified otherwise.
  - 1.    To be determined at preconstruction conference.
- B.    Electronic Submittals: Submittals shall, unless specifically accepted, be made in electronic format.
  - 1.    Each submittal shall be an electronic file in Adobe Acrobat Portable Document Format (PDF). Use the latest version available at time of execution of the Agreement.
  - 2.    Electronic files that contain more than 10 pages in PDF format shall contain internal bookmarking from an index page to major sections of the document.
  - 3.    PDF files shall be set to open "Bookmarks and Page" view.
  - 4.    Add general information to each PDF file, including title, subject, author, and keywords.
  - 5.    PDF files shall be set up to print legibly at 8.5-inch by 11-inch, or 11-inch by 17-inch. No other paper sizes will be accepted.
  - 6.    Submit new electronic files for each resubmittal.
  - 7.    Include a copy of the Transmittal of Contractor's Submittal form, located at end of section, with each electronic file.

8. Engineer will reject submittal that is not electronically submitted, unless specifically accepted.
9. Provide Engineer with authorization to reproduce and distribute each file as many times as necessary for Project documentation.
10. Detailed procedures for handling electronic submittals will be discussed at the preconstruction conference.

C. Transmittal of Submittal:

1. Contractor shall:
  - a. Review each submittal and check for compliance with Contract Documents.
  - b. Stamp each submittal with uniform approval stamp before submitting to Engineer.
    - 1) Stamp to include Project name, submittal number, Specification number, Contractor's reviewer name, date of Contractor's approval, and statement certifying submittal has been reviewed, checked, and approved for compliance with Contract Documents.
    - 2) Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
2. Complete, sign, and transmit with each submittal package, one Transmittal of Contractor's Submittal form attached at end of this section.
3. Identify each submittal with the following:
  - a. Numbering and Tracking System:
    - 1) Sequentially number each submittal.
    - 2) Resubmission of submittal shall have original number with sequential alphabetic suffix.
  - b. Specification section and paragraph to which submittal applies.
  - c. Project title and Engineer's project number.
  - d. Date of transmittal.
  - e. Names of Contractor, Subcontractor or Supplier, and manufacturer as appropriate.
4. Identify and describe each deviation or variation from Contract Documents.

D. Format:

1. Do not base Shop Drawings on reproductions of Contract Documents.
2. Package submittal information by individual Specification section. Do not combine different specification sections together in submittal package, unless otherwise directed in specification.

3. Present in a clear and thorough manner and in sufficient detail to show kind, size, arrangement, and function of components, materials, and devices, and compliance with Contract Documents.
  4. Index with labeled tab dividers in orderly manner.
- E. Timeliness: Schedule and submit in accordance Schedule of Submittals and requirements of individual Specification sections.
- F. Processing Time:
1. Time for review shall commence on Engineer's receipt of submittal.
  2. Engineer will act upon Contractor's submittal and transmit response to Contractor not later than 30 days after receipt, unless otherwise specified. For submittals in excess of 50 pages, Engineer's response will be within 45 days after receipt.
  3. Resubmittals will be subject to same review time.
  4. No adjustment of Contract Times or Price will be allowed as a result of delays in progress of Work caused by rejection and subsequent resubmittals.
- G. Resubmittals: Clearly identify each correction or change made.
- H. Incomplete Submittals:
1. Engineer will return entire submittal for Contractor's revision if preliminary review deems it incomplete.
  2. When any of the following are missing, submittal will be deemed incomplete:
    - a. Contractor's review stamp; completed and signed.
    - b. Transmittal of Contractor's Submittal; completed and signed.
    - c. Clear evidence that the Contractor has performed the required review.
    - d. Substantive components of a submittal.
- I. Submittals not required by Contract Documents:
1. Will not be reviewed and will be returned stamped "Not Subject to Review."
  2. Engineer will keep one copy and return submittal to Contractor.

### 1.03 ACTION SUBMITTALS

- A. Prepare and submit Action Submittals required by individual Specification sections.
- B. Shop Drawings:
  - 1. Identify and Indicate:
    - a. Applicable Contract Drawing and Detail number, products, units and assemblies, and system or equipment identification or tag numbers.
    - b. Equipment and Component Title: Identical to title shown on Drawings.
    - c. Critical field dimensions and relationships to other critical features of Work. Note dimensions established by field measurement.
    - d. Project-specific information drawn accurately to scale.
  - 2. Manufacturer's standard schematic drawings and diagrams as follows:
    - a. Modify to delete information that is not applicable to the Work.
    - b. Supplement standard information to provide information specifically applicable to the Work.
  - 3. Product Data: Provide as specified in individual specifications.
  - 4. Foreign Manufacturers: When proposed, include names and addresses of at least two companies that maintain technical service representatives close to Project.
- C. Samples:
  - 1. Copies: Two, unless otherwise specified in individual Specifications.
  - 2. Preparation: Mount, display, or package Samples in manner specified to facilitate review of quality. Attach label on unexposed side that includes the following:
    - a. Manufacturer name.
    - b. Model number.
    - c. Material.
    - d. Sample source.
  - 3. Manufacturer's Color Chart: Units or sections of units showing full range of colors, textures, and patterns available.
  - 4. Full-size Samples:
    - a. Size as indicated in individual specification section.
    - b. Prepared from same materials to be used for the Work.
    - c. Cured and finished in manner specified.
    - d. Physically identical with product proposed for use.

- D. Action Submittal Dispositions: Engineer will review, comment, stamp, and distribute as noted:
1. Approved:
    - a. Contractor may incorporate product(s) or implement Work covered by submittal.
    - b. Distribution: Electronic.
  2. Approved as Noted:
    - a. Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with Engineer's notations.
    - b. Distribution: Electronic.
  3. Partial Approval, Resubmit as Noted:
    - a. Make corrections or obtain missing portions, and resubmit.
    - b. Except for portions indicated, Contractor may begin to incorporate product(s) or implement Work covered by submittal, in accordance with Engineer's notations.
    - c. Distribution: Electronic.
  4. Revise and Resubmit:
    - a. Contractor may not incorporate product(s) or implement Work covered by submittal.
    - b. Distribution: Electronic.
- E. Backcharges for Review of Resubmittals: Where a resubmittal is returned as "Partially Approved, Resubmit as Noted" or "Revise and Resubmit", Contractor shall be subject to charges from the Owner for reimbursement of Engineer's charges associated with review of the 2<sup>nd</sup> and subsequent resubmittals at a cost of \$250 each for submittal of less than 30 pages or 10 Drawings, and \$500 for any larger submittals.

#### 1.04 INFORMATIONAL SUBMITTALS

- A. General:
1. Copies: Submit three copies, unless otherwise indicated in individual Specification section.
  2. Refer to individual Specification sections for specific submittal requirements.
  3. Engineer will review each submittal. If submittal meets conditions of the Contract, Engineer will forward copy to appropriate parties. If Engineer determines submittal does not meet conditions of the Contract and is therefore considered unacceptable, Engineer will retain one copy and return remaining copy with review comments to Contractor, and require that submittal be corrected and resubmitted.

B. Certificates:

1. General:
  - a. Provide notarized statement that includes signature of entity responsible for preparing certification.
  - b. Signed by officer or other individual authorized to sign documents on behalf of that entity.
2. Welding: In accordance with individual specification sections.
3. Installer: Prepare written statements on manufacturer's letterhead certifying installer complies with requirements as specified in individual Specification section.
4. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
5. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in individual Specification sections.
6. Manufacturer's Certificate of Compliance: In accordance with Section 01 61 00, Common Product Requirements.
7. Manufacturer's Certificate of Proper Installation: In accordance with Section 01 43 33, Manufacturers' Field Services.

C. Construction Photographs and Video: In accordance with Section 01 31 13, Project Coordination, and as may otherwise be required in Contract Documents.

D. Closeout Submittals: In accordance with Section 01 77 00, Closeout Procedures.

E. Contractor-design Data (related to temporary construction):

1. Written and graphic information.
2. List of assumptions.
3. List of performance and design criteria.
4. Summary of loads or load diagram, if applicable.
5. Calculations.
6. List of applicable codes and regulations.
7. Name and version of software.
8. Information requested in individual specification section.

F. Deferred Submittals: See Drawings for list of deferred submittals.

1. Contractor-design data related to permanent construction:
  - a. List of assumptions.
  - b. List of performance and design criteria.
  - c. Summary of loads or load diagram, if applicable.



- d. Calculations.
    - e. List of applicable codes and regulations.
    - f. Name and version of design software.
    - g. Factory test results.
    - h. Informational submittals requested in individual Specification section.
  - 2. Prior to installation of indicated structural or nonstructural element, equipment, distribution system, or component or its anchorage, submit calculations and test results of Contractor-designed components for review by Engineer.
- G. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual Specification section.
- H. Operation and Maintenance Data: As required in Section 01 78 23, Operation and Maintenance Data.
- I. Payment:
- 1. Application for Payment: In accordance with Section 01 29 00, Payment Procedures.
  - 2. Schedule of Values: In accordance with Section 01 29 00, Payment Procedures.
  - 3. Schedule of Estimated Progress Payments: In accordance with Section 01 29 00, Payment Procedures.
- J. Quality Control Documentation: As required in Section 01 45 16.13, Contractor Quality Control.
- K. Schedules:
- 1. Schedule of Submittals: Prepare separately or in combination with Progress Schedule as specified in Section 01 32 00, Construction Progress Documentation.
    - a. Show for each, at a minimum, the following:
      - 1) Specification section number.
      - 2) Identification by numbering and tracking system as specified under Paragraph Transmittal of Submittal.
      - 3) Estimated date of submission to Engineer, including reviewing and processing time.
    - b. On a monthly basis, submit updated Schedule of Submittals to Engineer if changes have occurred or resubmittals are required.
  - 2. Progress Schedules: In accordance with Section 01 32 00, Construction Progress Documentation.

- L. Special Guarantee: Supplier's written guarantee as required in individual Specification sections.
- M. Statement of Qualification: Evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of professional land surveyor, engineer, materials testing laboratory, specialty Subcontractor, trade, Specialist, consultant, installer, and other professionals.
- N. Submittals Required by Laws, Regulations, and Governing Agencies:
  - 1. Promptly submit promptly notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
  - 2. Transmit to Engineer for Owner's records one copy of correspondence and transmittals (to include enclosures and attachments) between Contractor and governing agency.
- O. Test, Evaluation, and Inspection Reports:
  - 1. General: Shall contain signature of person responsible for test or report.
  - 2. Factory:
    - a. Identification of product and specification section, type of inspection or test with referenced standard or code.
    - b. Date of test, Project title and number, and name and signature of authorized person.
    - c. Test results.
    - d. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
    - e. Provide interpretation of test results, when requested by Engineer.
    - f. Other items as identified in individual Specification sections.
  - 3. Field:
    - a. As a minimum, include the following:
      - 1) Project title and number.
      - 2) Date and time.
      - 3) Record of temperature and weather conditions.
      - 4) Identification of product and Specification section.
      - 5) Type and location of test, Sample, or inspection, including referenced standard or code.
      - 6) Date issued, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.

- 7) If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
- 8) Provide interpretation of test results, when requested by Engineer.
- 9) Other items as identified in individual Specification sections.

P. Testing and Startup Data: In accordance with Section 01 91 14, Equipment Testing and Facility Startup.

Q. Training Data: In accordance with Section 01 43 33, Manufacturers' Field Services.

#### 1.05 SUPPLEMENTS

A. The supplements listed below, following "End of Section", are part of this Specification.

1. Forms: Transmittal of Contractor's Submittal.

#### **PART 2 PRODUCTS (NOT USED)**

#### **PART 3 EXECUTION (NOT USED)**

#### **END OF SECTION**



<div style="display: flex; align-items: center;"> <div style="font-size: 2em; font-weight: bold; margin-right: 10px;">Jacobs</div> <div> <b>TRANSMITTAL OF CONTRACTOR'S SUBMITTAL</b>  <small>(ATTACH TO EACH SUBMITTAL)</small> </div> </div>	
DATE: _____	
<b>TO:</b> _____ _____ _____ _____ _____  <b>FROM:</b> _____ <div style="text-align: center;">Contractor</div> _____ _____ _____	Submittal No.: _____ <div style="display: flex; justify-content: space-between;"> <input type="checkbox"/> New Submittal         <input type="checkbox"/> Resubmittal       </div> Project: _____ Project No.: _____ Specification Section No.: _____ <div style="text-align: center;"><b>(Cover only one section with each transmittal)</b></div> Schedule Date of Submittal: _____ _____
<b>SUBMITTAL TYPE:</b>	<input type="checkbox"/> Shop Drawing <input type="checkbox"/> Sample <input type="checkbox"/> Informational
<input type="checkbox"/> Deferred	

**The following items are hereby submitted:**

Number of Copies	Description of Item Submitted (Type, Size, Model Number, Etc.)	Spec. and Para. No.	Drawing or Brochure Number	Contains Variation to Contract	
				No	Yes

Contractor hereby certifies that (i) Contractor has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By: \_\_\_\_\_  
 Contractor (Authorized Signature)



**SECTION 01 43 33**  
**MANUFACTURERS' FIELD SERVICES**

**PART 1      GENERAL**

1.01      DEFINITIONS

- A.    Person-Day: One person for 8 hours within regular Contractor working hours.

1.02      SUBMITTALS

- A.    Informational Submittals:
  - 1.    Training Schedule: Submit, in accordance with requirements of this Specification, not less than 21 days prior to start of equipment installation and revise as necessary for acceptance.

1.03      QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

- A.    Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system, with full authority by the equipment manufacturer to issue the certifications required of the manufacturer. Additional qualifications may be specified in the individual Specification section.
- B.    Representative subject to acceptance by Owner and Engineer. No substitute representatives will be allowed unless prior written approval by such has been given.

**PART 2      PRODUCTS (NOT USED)**

**PART 3      EXECUTION**

3.01      FULFILLMENT OF SPECIFIED MINIMUM SERVICES

- A.    Furnish manufacturers' services, when required by an individual Specification section, to meet the requirements of this section.
- B.    Where time is necessary in excess of that stated in the Specifications for manufacturers' services, or when a minimum time is not specified, time required to perform specified services shall be considered incidental.
- C.    Schedule manufacturer' services to avoid conflict with other onsite testing or other manufacturers' onsite services.

- D. Determine, before scheduling services, that conditions necessary to allow successful testing have been met.
- E. Only those days of service approved by Engineer will be credited to fulfill specified minimum services.
- F. When specified in individual Specification sections, manufacturer's onsite services shall include:
  - 1. Assistance during product (system, subsystem, or component) installation to include observation, guidance, instruction of Contractor's assembly, erection, installation or application procedures.
  - 2. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish Manufacturer's Certificate of Proper Installation.
  - 3. Providing, on a daily basis, copies of manufacturers' representatives field notes and data to Engineer.
  - 4. Revisiting the Site as required to correct problems and until installation and operation are acceptable to Engineer.
  - 5. Resolution of assembly or installation problems attributable to or associated with respective manufacturer's products and systems.
  - 6. Assistance during functional and performance testing, and facility startup and evaluation.
  - 7. Training of Owner's personnel in the operation and maintenance of respective product as required.

### 3.02 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- A. When so specified, a Manufacturer's Certificate of Proper Installation form, a copy of which is attached to this section, shall be completed and signed by equipment manufacturer's representative.
- B. Such form shall certify signing party is a duly authorized representative of manufacturer, is empowered by manufacturer to inspect, approve, and operate their equipment and is authorized to make recommendations required to ensure equipment is complete and operational.

### 3.03 TRAINING

- A. General:
  - 1. Furnish manufacturers' representatives for detailed classroom and hands-on training to Owner's personnel on operation and maintenance of specified product (system, subsystem, component) and as may be required in applicable Specifications.



2. Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with Owner, and familiar with operation and maintenance manual information specified in Section 01 78 23, Operation and Maintenance Data.
3. Manufacturer's representative shall be familiar with facility operation and maintenance requirements as well as with specified equipment.
4. Furnish complete training materials, to include operation and maintenance data, to be retained by each trainee.

B. Training Schedule:

1. List specified equipment and systems that require training services and show:
  - a. Respective manufacturer.
  - b. Estimated dates for installation completion.
  - c. Estimated training dates.
2. Allow for multiple sessions when several shifts are involved.
3. Adjust schedule to ensure training of appropriate personnel as deemed necessary by Owner, and to allow full participation by manufacturers' representatives. Adjust schedule for interruptions in operability of equipment.
4. Coordinate with Section 01 32 00, Construction Progress Documentation, and Section 01 91 14, Equipment Testing and Facility Startup.

C. Prestartup Training:

1. Coordinate training sessions with Owner's operating personnel and manufacturers' representatives, and with submission of operation and maintenance manuals in accordance with Section 01 78 23, Operation and Maintenance Data.
2. Complete at least 14 days prior to beginning of facility startup.

D. Post-startup Training: If required in Specifications, furnish and coordinate training of Owner's operating personnel by respective manufacturer's representatives.

3.04 SUPPLEMENTS

A. The supplement listed below, following "End of Section," is part of this Specification.

1. Manufacturer's Certificate of Proper Installation.

**END OF SECTION**



**MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION**

OWNER \_\_\_\_\_ EQPT SERIAL NO: \_\_\_\_\_

EQPT TAG NO: \_\_\_\_\_ EQPT/SYSTEM: \_\_\_\_\_

PROJECT NO: \_\_\_\_\_ SPEC. SECTION: \_\_\_\_\_

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

☐ Installed in accordance with Manufacturer's recommendations.

☐ Inspected, checked, and adjusted.

☐ Serviced with proper initial lubricants.

☐ Electrical and mechanical connections meet quality and safety standards.

☐ All applicable safety equipment has been properly installed.

☐ Functional tests.

☐ System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Note: Attach any performance test documentation from manufacturer.

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate their equipment and (iii) authorized to make recommendations required to ensure equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: \_\_\_\_\_, 20\_\_\_\_

Manufacturer: \_\_\_\_\_

By Manufacturer's Authorized Representative: \_\_\_\_\_  
(Authorized Signature)



**SECTION 01 45 16.13**  
**CONTRACTOR QUALITY CONTROL**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
  - 1.    ASTM International (ASTM):
    - a.    D3740, Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
    - b.    E329, Use in the Evaluation of Testing and Inspection Agencies as Used in Construction.

**1.02      DEFINITIONS**

- A.    Contractor Quality Control (CQC): The means by which Contractor ensures that the construction, to include that performed by subcontractors and suppliers, complies with the requirements of the Contract.

**1.03      SUBMITTALS**

- A.    Informational Submittals:
  - 1.    CQC Plan: Submit, not later than 30 days after receipt of Notice to Proceed.
  - 2.    CQC Report: Submit, weekly, an original and one copy in report form.

**1.04      OWNER'S QUALITY ASSURANCE**

- A.    All Work is subject to Owner's quality assurance inspection and testing at all locations and at all reasonable times before acceptance to ensure strict compliance with the terms of the Contract Documents.
- B.    Owner's quality assurance inspections and tests are for the sole benefit of Owner and do not:
  - 1.    Relieve Contractor of responsibility for providing adequate quality control measures;
  - 2.    Relieve Contractor of responsibility for damage to or loss of the material before acceptance;
  - 3.    Constitute or imply acceptance; or
  - 4.    Affect the continuing rights of Owner after acceptance of the completed Work.

- C. The presence or absence of a quality assurance inspector does not relieve Contractor from any Contract requirement.
- D. Promptly furnish all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by Engineer.
- E. Owner may charge Contractor for any additional cost of inspection or test when:
  - 1. Work is not ready at the time specified by Contractor for inspection or test.
  - 2. when work as tested fails the required test requiring retesting.
  - 3. when prior rejection makes re-inspection or retest necessary.
  - 4. when Contractor's subsequent work after testing alters previously tested work requiring its retesting.
- F. Quality assurance inspections and tests will be performed in a manner that will not unnecessarily delay the Work.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**3.01 GENERAL**

- A. Maintain an adequate inspection system and perform such inspections as will ensure that the Work conforms to the Contract Documents.
- B. Maintain complete inspection records and make them available at all times to Owner and Engineer.
- C. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product that complies with the Contract Documents. The system shall cover all construction and demolition operations, both onsite and offsite, including Work by subcontractors, fabricators, suppliers and purchasing agents, and shall be keyed to the proposed construction sequence.

**3.02 COORDINATION MEETING**

- A. After the Preconstruction Conference, but before start of construction, and prior to acceptance of the CQC Plan, schedule a meeting with Engineer and Owner to discuss the quality control system.

- B. Develop a mutual understanding of the system details, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite Work, and the interrelationship of Contractor's management and control with the Owner's Quality Assurance.
- C. There may be occasions when subsequent conferences may be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures that may require corrective action by Contractor.

### 3.03 QUALITY CONTROL ORGANIZATION

- A. CQC System Manager:
  - 1. Designate an individual within Contractor's organization who will be responsible for overall management of CQC and have the authority to act in CQC matters for the Contractor.
  - 2. CQC System Manager may perform other duties on the Project.
  - 3. CQC System Manager shall be an experienced construction person, with a minimum of 3-years construction experience on similar type Work.
  - 4. CQC System Manager shall report to the Contractor's project manager or someone higher in the organization. Project manager in this context shall mean the individual with responsibility for the overall quality and production management of the Project.
  - 5. CQC System Manager shall be onsite during construction; periods of absence may not exceed three contiguous working days at any one time.
  - 6. Identify an alternate for CQC System Manager to serve with full authority during the System Manager's absence. The requirements for the alternate will be the same as for designated CQC System Manager.
- B. Organizational Changes: Obtain Engineer's acceptance before replacing the CQC manager. Requests for changes shall include name, and qualifications of the proposed replacement.

### 3.04 QUALITY CONTROL PHASING

- A. CQC shall include at least three phases of control to be conducted by CQC System Manager for all definable features of Work, as follows:
  - 1. Preparatory Phase:
    - a. Notify Owner at least 48 hours in advance of beginning any of the required action of the preparatory phase.
    - b. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The CQC System Manager shall instruct applicable CQC staff as to the acceptable level of workmanship required in order to meet Contract requirements.

- c. Document the results of the preparatory phase meeting by separate minutes prepared by the CQC System Manager and attached to the QC report.
  - d. Perform prior to beginning Work on each definable feature of Work:
    - 1) Review applicable Contract Specifications.
    - 2) Review applicable Contract Drawings.
    - 3) Verify that all materials and/or equipment have been tested, submitted, and approved.
    - 4) Verify that provisions have been made to provide required control inspection and testing.
    - 5) Examine the Work area to verify that all required preliminary Work has been completed and is in compliance with the Contract.
    - 6) Perform a physical examination of required materials, equipment, and sample Work to verify that they are on hand, conform to approved Shop Drawing or submitted data, and are properly stored.
    - 7) Review the appropriate activity hazard analysis to verify safety requirements are met.
    - 8) Review procedures for constructing the Work, including repetitive deficiencies.
    - 9) Document construction tolerances and workmanship standards for that phase of the Work.
    - 10) Check to verify that the plan for the Work to be performed, if so required, has been accepted by Engineer.
2. Initial Phase:
- a. Accomplish at the beginning of a definable feature of Work:
    - 1) Notify Owner at least 48 hours in advance of beginning the initial phase.
    - 2) Perform prior to beginning Work on each definable feature of Work:
      - a) Review minutes of the preparatory meeting.
      - b) Check preliminary Work to verify compliance with Contract requirements.
      - c) Verify required control inspection and testing.
      - d) Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Comparison with sample panels is appropriate.
      - e) Resolve all differences.
      - f) Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.



- 3) Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the QC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
  - 4) The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.
3. Follow-up Phase:
- a. Perform daily checks to verify continuing compliance with Contract requirements, including control testing, until completion of the particular feature of Work.
  - b. Daily checks shall be made a matter of record in the CQC documentation and shall document specific results of inspections for all features of Work for the day or shift.
  - c. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of Work that will be affected by the deficient Work. Constructing upon or concealing nonconforming Work will not be allowed.
4. Additional Preparatory and Initial Phases: Additional preparatory and initial phases may be conducted on the same definable features of Work as determined by Owner if the quality of ongoing Work is unacceptable; or if there are changes in the applicable QC staff or in the onsite production supervision or work crew; or if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

### 3.05 CONTRACTOR QUALITY CONTROL PLAN

#### A. General:

1. Plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used.
2. An interim plan for the first 30 days of operation will be considered.
3. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of Work to be started.
4. Work outside of the features of Work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of Work to be started.

B. Content:

1. Plan shall cover the intended CQC organization for the entire Contract and shall include the following, as a minimum:
  - a. Letters of Authority: A copy of a letter to the CQC System Manager signed by an authorized official of the firm, describing the responsibilities and delegating sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop Work which is not in compliance with the Contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities and responsibilities. Copies of these letters will also be furnished to Owner.
  - b. Submittals: Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers and purchasing agents.
  - c. Testing: Control, verification and acceptance testing procedures for each specific test to include the test name, frequency, specification paragraph containing the test requirements, the personnel and laboratory responsible for each type of test, and an estimate of the number of tests required.
  - d. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests, including documentation.
  - e. Procedures for tracking deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.
  - f. Reporting procedures, including proposed reporting formats; include a copy of the CQC report form.
- C. Acceptance of Plans: Acceptance of the Contractor's basic and addendum CQC plans is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. Owner reserves the right to require Contractor to make changes in the CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.
- D. Notification of Changes: After acceptance of the CQC plan, Contractor shall notify Engineer, in writing, a minimum of 7 calendar days prior to any proposed change. Proposed changes are subject to acceptance by Engineer.

### 3.06 CONTRACTOR QUALITY CONTROL REPORT

- A. As a minimum, prepare a CQC report for every 7 calendar days. Account for all days throughout the life of the Contract. Reports shall be signed and dated by CQC System Manager. Include copies of test reports and copies of reports prepared by QC staff.
- B. Maintain current records of quality control operations, activities, and tests performed, including the Work of subcontractors and suppliers.
- C. Records shall be on an acceptable form and shall be a complete description of inspections, the results of inspections, daily activities, tests, and other items, including but not limited to the following:
  - 1. Contractor/subcontractor and their areas of responsibility.
  - 2. Operating plant/equipment with hours worked, idle, or down for repair.
  - 3. Work performed today, giving location, description, and by whom.  
When a network schedule is used, identify each phase of Work performed each day by activity number.
  - 4. Test and/or control activities performed with results and references to specifications/plan requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.
  - 5. Material received with statement as to its acceptability and storage.
  - 6. Identify submittals reviewed, with Contract reference, by whom, and action taken.
  - 7. Offsite surveillance activities, including actions taken.
  - 8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
  - 9. List instructions given/received and conflicts in Drawings and/or Specifications.
  - 10. Contractor's verification statement.
  - 11. Indicate a description of trades working on the Project; the number of personnel working; weather conditions encountered; and any delays encountered.
  - 12. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in file work and workmanship comply with the Contract.

### 3.07 SUBMITTAL QUALITY CONTROL

- A. Submittals shall be as specified in Section 01 33 00, Submittal Procedures. The CQC organization shall be responsible for certifying that all submittals are in compliance with the Contract requirements. Owner will furnish copies of test report forms upon request by Contractor. Contractor may use other forms as approved.

### 3.08 TESTING QUALITY CONTROL

#### A. Testing Procedure:

1. Perform tests specified or required to verify that control measures are adequate to provide a product which conforms to Contract requirements. Perform the following activities and record the following data:
  - a. Verify testing procedures comply with contract requirements.
  - b. Verify facilities and testing equipment are available and comply with testing standards.
  - c. Check test instrument calibration data against certified standards.
  - d. Verify recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
  - e. Documentation:
    - 1) Record results of all tests taken, both passing and failing, on the CQC report for the date taken.
    - 2) Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test.
    - 3) Actual test reports may be submitted later, if approved by Engineer, with a reference to the test number and date taken.
    - 4) Provide directly to Engineer an information copy of tests performed by an offsite or commercial test facility. Test results shall be signed by an engineer registered in the state where the tests are performed.
    - 5) Failure to submit timely test reports, as stated, may result in nonpayment for related Work performed and disapproval of the test facility for this Contract.

- #### B. Testing Laboratories:
- Laboratory facilities, including personnel and equipment, utilized for testing soils, concrete, asphalt and steel shall meet criteria detailed in ASTM D3740 and ASTM E329, and be accredited by the American Association of Laboratory Accreditation (AALA), National Institute of Standards and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO), or other approved national accreditation authority. Personnel performing concrete testing shall be certified by the American Concrete Institute (ACI).

3.09 COMPLETION INSPECTION

- A. CQC System Manager shall conduct an inspection of the Work at the completion of all Work or any milestone established by a completion time stated in the Contract.
- B. Punchlist:
  - 1. CQC System Manager shall develop a punchlist of items which do not conform to the Contract requirements.
  - 2. Include punchlist in the CQC report, indicating the estimated date by which the deficiencies will be corrected.
  - 3. CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected and so notify the Owner.
  - 4. These inspections and any deficiency corrections required will be accomplished within the time stated for completion of the entire Work or any particular increment thereof if the Project is divided into increments by separate completion dates.

**END OF SECTION**



**SECTION 01 45 33**  
**SPECIAL INSPECTION, OBSERVATION, AND TESTING**

**PART 1      GENERAL**

**1.01      SUMMARY**

- A.    This section covers requirements for Special Inspection, Observation, and Testing required in accordance with Chapter 17 of the 2012 IBC and is in addition to and supplements requirements included in Statement of Special Inspections shown on Drawings.

**1.02      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
  - 1.    American Society of Civil Engineers (ASCE): 7, Minimum Design Loads for Buildings and Other Structures.
  - 2.    International Code Council (ICC):
    - a.    International Building Code (IBC).
    - b.    Evaluation Service (ICC-ES) Reports and Legacy Reports.

**1.03      DEFINITIONS**

- A.    Agencies and Personnel:
  - 1.    Agency Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
  - 2.    Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
  - 3.    Registered Design Professional in Responsible Charge: An individual who is registered or licensed to practice their respective design profession as defined by statutory requirements of professional registration laws of state or jurisdiction in which Project is to be constructed.

4. Special Inspector: Qualified person employed by Owner who will demonstrate competence to the satisfaction of AHJ for inspection of a particular type of construction or operation requiring Special Inspection. Where a structure, system or component requiring special inspection is designed by a delegated engineer, that Registered Engineer shall act as the special inspector or shall otherwise provide for all special inspection services as indicated in the construction documents and required by the IBC. Cost for delegated design special inspection services shall be deemed to have been included in the delegated design contractor's cost for services.
- B. Statement of Special Inspections: Detailed written procedure contained on Drawings establishing systems and components subject to Special Inspection, Observation, and Testing during construction, type and frequency of testing, extent and duration of Special Inspection, and reports to be completed and distributed by Special Inspector.
- C. Special Inspection:
1. Special Inspection: Inspection required of materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved Contract Documents and referenced standards.
  2. Special Inspection, Continuous: Full-time observation of work requiring Special Inspection by an approved Special Inspector who is present in area where the Work is being performed.
  3. Special Inspection, Periodic: Part-time or intermittent observation of the Work requiring Special Inspection by an approved Special Inspector who is present in area where the Work has been or is being performed, and at completion of the Work.
- D. Structural Systems and Components:
1. Diaphragm: Component of structural lateral load resisting system consisting of roof, floor, or other membrane or bracing system acting to transfer lateral forces to vertical resisting elements of structure.
  2. Drag Strut or Collector: Component of structural lateral load resisting system consisting of diaphragm or shear wall element that collects and transfers diaphragm shear forces to vertical force-resisting elements or distributes forces within diaphragm or shear wall.
  3. Seismic-Force-Resisting System: That part of structural lateral load resisting system that has been considered in the design to provide required resistance to seismic forces identified on Drawings.



4. Shear Wall: Component of structural lateral load resisting system consisting of a wall designed to resist lateral forces parallel to plane of the wall. Unless noted otherwise on Drawings, load-bearing walls with direct in-plane connections to roof and floors shall be considered to be shear walls.
5. Wind Force Resisting System: That part of the structural system that has been considered in the design to provide required resistance to wind forces identified on Drawings.

E. Nonstructural Components:

1. Architectural Component Supports: Structural members or assemblies of members which transmit loads and forces from architectural systems or components to structure, including braces, frames, struts, and attachments.
2. Electrical Component Supports: Structural members or assemblies which transmit loads and forces from electrical equipment to structure, including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
3. Mechanical Component Supports: Structural members or assemblies which transmit loads and forces from mechanical equipment to structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

F. Professional Observation:

1. Does not include or waive responsibility for required Special Inspection or inspections by building official.
2. Requirements are indicated on Statement of Special Inspections provided on Drawings.
3. Geotechnical Observation: Visual observation of selected subgrade bearing surfaces and installation of deep foundation elements by a registered design professional for general conformance to Contract Documents.
4. Structural Observation: Visual observation of structural system(s) by a registered design professional for general conformance to Contract Documents.

## 1.04 SUBMITTALS

### A. Informational Submittals:

1. Contractor's Statement of Responsibility: Form shall be completed by entity responsible for construction of main wind-force-resisting system and wind-resisting components listed in Statement of Special Inspections. Refer to Article Supplements located at end of section.
2. Fabricator's Certificate of Compliance: Form shall be completed by entity responsible for shop fabrication of structural load-bearing members and assemblies. Refer to Article Supplements located at end of section.

## 1.05 STATEMENT OF SPECIAL INSPECTIONS REQUIREMENTS

### A. Designated Systems for Inspection:

1. Seismic-force-resisting systems designated under IBC Section 1705 and subject to Special Inspection under Section 1705: None required.
2. Wind-force-resisting systems designated under IBC Section 1705: See Drawings for basic lateral load resisting systems for each structure and other designated wind-resisting components.
3. Architectural, Mechanical, and Electrical Components subject to Special Inspection under IBC Section 1705.12 for Seismic Resistance: As listed in Section 01 45 36, Equipment Seismic Certification.

### B. Statement of Special Inspections:

1. As included in Drawings and in support of building permit application, Project-specific requirements were prepared by Registered Design Professional in Responsible Charge. The following identifies elements of inspection, observation, and testing program to be followed in construction of the Work:
  - a. Designated wind-force-resisting systems and components that are subject to Special Inspection and Structural Observation for lateral load resistance.
  - b. Special Inspection and testing required by IBC Section 1705 and other applicable sections and referenced standards therein.
  - c. Type and frequency of Special Inspection required.
  - d. Type and frequency of testing required.
  - e. Required frequency and distribution of testing and Special Inspection reports to be distributed by Special Inspector to Engineer, Contractor, building official, and Owner.

- f. Geotechnical Observation to be Performed: Required frequency and distribution of Geotechnical Observation reports by registered design professional to Contractor, building official, and Owner.
  - g. Structural Observations to be Performed: Required frequency and distribution of Structural Observation reports by registered design professional to Contractor, building official, and Owner.
- C. Special Inspection and associated testing of shop fabrication and field construction will be performed by an approved accredited independent agency or by Authority Having Jurisdiction's (AHJ) approved, qualified inspection staff. Owner will secure and pay for services of agency to perform Special Inspection and associated testing.
- D. Code required Special Inspection with associated testing and Professional Observation, as provided in Statement of Special Inspections on Drawings and further provided in this section, is for benefit of Owner and does not:
  - 1. Relieve Contractor of responsibility for providing adequate quality control measures.
  - 2. Relieve Contractor of responsibility for damage to or loss of material before acceptance.
  - 3. Constitute or imply acceptance.
  - 4. Affect continuing rights of Owner after acceptance of completed Work.
- E. The presence or absence of code required Special Inspector and Professional Observer does not relieve Contractor from Contract requirements.
- F. Contractor is responsible for additional costs associated with Special Inspection and Testing and Observation when Work is not ready at time identified by Contractor and Special Inspectors and Professional Observer are onsite, but not able to provide contracted services.
- G. Contractor is responsible for associated costs for additional Special Inspection and Testing and Professional Observation by Special Inspectors and Professional Observers required because of rejection of materials of in place Work that cannot be made compliant to Contract Document without additional inspections and observation and testing.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**3.01 GENERAL**

- A. Requirements of the Statement of Special Inspections are provided by the Owner. All other testing and inspections, unless noted otherwise, are provided by Contractor.
- B. Provide access to shop or Site for Special Inspection and Testing and Professional Observation requirements.
- C. Notify Engineer in advance of required Special Inspection and Professional Observation no later than 48 hours prior to date of Special Inspection and Professional Observation.
- D. Provide access for Special Inspector to construction documents.
- E. Retain special inspection records on-site to be readily available for review.
- F. Cooperate with Special Inspector and provide safe access to the Work to be inspected.
- G. Submit Fabricator's Certificates of Compliance for approved fabricators.
- H. Provide reasonable auxiliary services as requested by the Special Inspector. Auxiliary services required include, but not limited to:
  - 1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests to assist the Special Inspector in performing test/inspections.
  - 2. Providing storage space for the Special Inspector's exclusive use, such as for storing and curing concrete test samples and delivery of samples to testing laboratories.
  - 3. Providing the Special Inspector with access to all approved submittals.
  - 4. Providing security and protection of samples and test equipment at the Project Site.
  - 5. Provide samples of materials to be tested in required quantities.
- I. When required by Registered Design Professional in Responsible Charge, provide access for mechanical and electrical component inspections for those items requiring certification.

- J. Materials and systems shall be inspected during placement where Continuous Special Inspection is required.
- K. Where Periodic Special Inspection is indicated in the Statement of Special Inspections:
  - 1. Schedule inspections for either during or at completion of their placement or a combination or both.
  - 2. Schedule periodically inspected Work (either inspected during or after its placement) so that corrections can be completed and re-inspected before Work is inaccessible.
  - 3. Sampling a portion of the Work is not allowed. Schedules shall provide for inspection of all Work requiring periodic inspection.

### 3.02 SUPPLEMENTS

- A. The supplements listed below, following “End of Section,” are a part of this Specification:
  - 1. Contractor’s Statement of Responsibility.
  - 2. Fabricator’s Certificate of Compliance.

### **END OF SECTION**



**CONTRACTOR'S STATEMENT OF RESPONSIBILITY**


---

 (Project)

---

 (Name of Contracting Company)

---

 (Business Address)

 (\_\_\_\_\_) \_\_\_\_\_  
 (Telephone)

 (\_\_\_\_\_) \_\_\_\_\_  
 (Fax)

I, (We) hereby certify that I am (we are) aware of the Special Inspection and Testing and Professional Observation and component certification requirements contained in Contract Documents for this Project for wind force-resisting systems , and for components including architectural, mechanical, and electrical components, as listed in Statement of Special Inspections on Drawings and Section 01 45 36, Equipment Seismic Certification, and that:

- I, (We) aware of the systems and the requirements of the special inspection and acknowledge our responsibility in the implementation of the Statement of Special Inspections for the construction of the following systems:

<b>Facility</b>	<b>Specification</b>	<b>Lateral Force-Resisting System</b>
20-Dewatering Building and Control Building		Ordinary Precast Concrete Shear Walls
50-Chlorine and SO <sub>2</sub> Building		Intermediate Precast Concrete Shear Walls

- and I, (We) are responsible for construction of the following components:

<b>Facility</b>	<b>Component</b>
09-Electrical Site Work	Standby Engine Generators
09-Electrical Site Work	Switchgear
09-Electrical Site Work	Secondary Unit Substation

Facility	Component
31-Pump Station	Fire Protection Equipment
44-Operations Building	Lab HVAC Distribution Systems for Hazardous Materials
44-Operations Building	Lab Piping Distribution Systems for Hazardous Materials
50-Chlorine and SO2 Building	Fire Detector and Alarm
50-Chlorine and SO2 Building	Chlorine Detector and Alarm
50-Chlorine and SO2 Building	SO2 Detector and Alarm
50-Chlorine and SO2 Building	Chlorine Scrubber
50-Chlorine and SO2 Building	Chlorine Scrubber Ductwork
50-Chlorine and SO2 Building	Chlorine and SO2 Piping

3. Control of this Work will be exercised to obtain conformance with Contract Documents approved by building official.
4. Procedures within the Contractor's organization to be used for exercising control of the Work, method and frequency of reporting, and distribution of reports required under Statement of Special Inspections for Project are attached to this statement.
5. I, (We) will provide 48-hour notification to Engineer and approved inspection agency as required for structural tests and Special Inspection for Project.
6. The following person is hereby identified as exercising control over requirements of this section for the Work designated above:

Name: \_\_\_\_\_

Qualifications: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_



(Print name and official title of person signing this form)

Signed by: \_\_\_\_\_

Date: \_\_\_\_\_

Project Name: \_\_\_\_\_



### FABRICATOR'S CERTIFICATE OF COMPLIANCE

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per section 1704.2.5 of 2012 IBC must submit Fabricator's Certificate of Compliance at the completion of fabrication.

---

(Project)

---

(Fabricator's Name)

---

(Business Address)

---

(Certification or Approval Agency)

---

(Certification Number)

---

(Date of Last Audit or Approval)

Description of structural members and assemblies that have been fabricated:

---

---

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---

---

I hereby certify that items described above were fabricated in strict accordance with approved construction documents.

---

(Name and Title) type or print

---

(Signature and Date)

Attach copies of fabricator's certification or building code evaluation service report and fabricator's quality control manual.



**SECTION 01 45 36**  
**EQUIPMENT SEISMIC CERTIFICATION**

**PART 1      GENERAL**

**1.01      SUMMARY**

- A.    This section covers the code required seismic certification of mechanical and electrical equipment in accordance with 2012 IBC, Chapter 17.

**1.02      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
  - 1.    American Society of Civil Engineers (ASCE): 7, Minimum Design Loads for Buildings and Other Structures.
  - 2.    Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a.    344, Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.
    - b.    693, Recommended Practice for Seismic Design of Substations.
  - 3.    International Code Council (ICC):
    - a.    International Building Code (IBC).
    - b.    Evaluation Service (ICC-ES) Reports and Legacy Reports.
  - 4.    National Fire Protection Association (NFPA): 13, Standard for Installation of Sprinkler Systems.

**1.03      DEFINITIONS**

- A.    Agencies and Personnel:
  - 1.    Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
- B.    Component Supports:
  - 1.    Electrical: Structural members or assemblies which transmit loads and forces from electrical equipment to the structure, including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
  - 2.    Mechanical: Structural members or assemblies which transmit loads and forces from mechanical equipment to the structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

## 1.04 SUBMITTALS

### A. Informational Submittals:

1. Seismic Qualification of Mechanical and Electrical Equipment  
Certification of Compliance: Submit for mechanical and electrical components having a component importance factor of 1.5 as designated herein. Submit for other components having component importance factor of 1.0 where test results are submitted as an alternate to required calculations under 13.2.5 of ASCE 7-10. Refer to Article Supplements located at end of section.
2. If required by Engineer, submit documentation of testing results or analytical data.

## 1.05 STATEMENT OF SPECIAL INSPECTIONS (PLAN) REQUIREMENTS

- A. Complete special inspection and testing in accordance with Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Architectural, mechanical, and electrical components subject to special inspection and testing under IBC Section 1705.11 for seismic resistance, as listed in table in Article Mechanical and Electrical Component Certification are in addition to requirements of Section 01 45 33, Special Inspection, Observation, and Testing.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.01 MECHANICAL AND ELECTRICAL COMPONENT CERTIFICATION

- A. Provide certificate of compliance for mechanical and electrical component testing and certification on form located at end of section. Provide certificates for equipment and components listed in the following table:

<b>Mechanical and Electrical Components Requiring Certification of Compliance for Seismic Testing or Analysis under IBC Section 1705.12.3</b>			
Facility	Component	Component Importance Factor, $I_p$	Component to Remain Operable?
50- Chlorine and SO2 Building	Fire Detector and Alarm	1.5	Yes
50- Chlorine and SO2 Building	Chlorine Detector and Alarm	1.5	Yes

<b>Mechanical and Electrical Components Requiring Certification of Compliance for Seismic Testing or Analysis under IBC Section 1705.12.3</b>			
Facility	Component	Component Importance Factor, $I_p$	Component to Remain Operable?
50- Chlorine and SO2 Building	SO2 Detector and Alarm	1.5	Yes
50-Chlorine and SO2 Building	Chlorine Scrubber	1.5	Yes
50- Chlorine and SO2 Building	Chlorine Scrubber Ductwork	1.5	Yes
50-Chlorine and SO2 Building	Chlorine and SO2 Piping	1.5	Not Required

- B. Certify mechanical and electrical components listed in table above on basis of tests on a shaking table, by three-dimensional shock tests, by an analytical method using dynamic characteristics, and forces as provided in Section 01 88 15, Anchorage and Bracing, or by more rigorous analysis. Submitted testing and experience data shall meet requirements of ASCE 7-10 Section 13.2.5 and Section 13.2.6, respectively.
- C. Re-used existing components do not need to be certified.
- D. Component and attachment testing and certification shall be in accordance with applicable provisions of IBC Section 1705.12.3. Seismic testing and certification is in addition to functional and performance testing required for new equipment for field quality control or start-up testing as indicated in technical specification.
- E. Where equipment is required to remain operable following the design earthquake ground motion, active parts or energized components shall be certified on basis of approved shake table testing or experience only unless demonstrably similar to other equipment so qualified.
- F. Components with hazardous contents shall be certified to contain materials under the design earthquake.

3.02 SUPPLEMENTS

- A. The supplement listed below, following “End of Section,” is a part of this Specification:
  - 1. Seismic Qualification of Mechanical and Electrical Equipment  
Certificate of Compliance.

**END OF SECTION**



**SEISMIC QUALIFICATION OF MECHANICAL AND ELECTRICAL EQUIPMENT  
CERTIFICATE OF COMPLIANCE**

\_\_\_\_\_  
(Component under Certification)

\_\_\_\_\_  
(Name of Manufacturer)

\_\_\_\_\_  
(Tag Number or Equipment ID)

\_\_\_\_\_  
(Business Address)

\_\_\_\_\_  
(Drawing/Detail Number)

\_\_\_\_\_  
(\_\_\_\_\_)\_\_\_\_\_  
(Telephone)

This is to certify that above-referenced component meets or exceeds requirements of Section 1705.12.3 of 2012 IBC for seismic qualification of equipment. Basis of qualification is by:

(Check Applicable)

☐ Shake-table Test

☐ Three-dimensional Shock Test

☐ Analytical Method

☐ Experience Data

☐ Other \_\_\_\_\_

under acceptance criteria of:

☐ ICC-ES AC156, Acceptance Criteria for Seismic Qualification by Shake-Table Testing of Nonstructural Components and Systems

☐ IEEE 693, IEEE Recommended Practice for Seismic Design of Substations

☐ IEEE 344, IEEE Recommended Standard Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations for experience data

☐ ASCE 7-10 Chapter 13 for analytical methods

☐ Other \_\_\_\_\_

for the following earthquake hazard rating:

IEEE Seismic Qualification Level: \_\_\_\_\_

Mapped MCE, 5 Percent Damped, Short Period Spectral Response  
Acceleration,  $S_s$ : \_\_\_\_\_

Design, 5 Percent Damped, Short Period Spectral Response  
Acceleration,  $S_{DS}$ : \_\_\_\_\_

Component Importance Factor,  $I_p$ : \_\_\_\_\_

Component Response Modification Factor,  $R_p$ : \_\_\_\_\_

Height of Point of Attachment as Factor of Average Roof Height,  
 $z/h$ : \_\_\_\_\_

This certification covers both the integrity of the equipment and anchorage of equipment. Required mounting and anchorage details are shown on attached Seismic Outline Drawing for the most seismically vulnerable component covered by this certification.

Manufacturer's Representative Signature: \_\_\_\_\_

Address: \_\_\_\_\_

Date: \_\_\_\_\_

**SECTION 01 50 00  
TEMPORARY FACILITIES AND CONTROLS**

**PART 1      GENERAL**

**1.01      REFERENCES**

A.    The following is a list of standards which may be referenced in this section:

1.    American Nursery and Landscape Association (ANLA): American Standards for Nursery Stock.
2.    Federal Emergency Management Agency (FEMA).
3.    National Fire Prevention Association (NFPA): 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.
4.    Telecommunications Industry Association (TIA): 568-C, Commercial Building Telecommunications Cabling Standard.
5.    U.S. Department of Agriculture (USDA): Urban Hydrology for Small Watersheds.
6.    U.S. Weather Bureau: Rainfall-Frequency Atlas of the U.S. for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years.

**1.02      SUBMITTALS**

A.    Informational Submittals:

1.    Copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.
2.    Temporary Construction Submittals:
  - a.    Contractor's and Engineer's field offices, storage yard, and storage building plans, including gravel surfaced area.
  - b.    Fencing and protective barrier locations and details.
  - c.    Staging area location plan.
  - d.    Plan for maintenance of existing plant operations.

**1.03      MOBILIZATION**

A.    Mobilization shall include, but not be limited to, these principal items:

1.    Obtaining required permits.
2.    Obtaining off-site parking area for Contractor's employees
3.    Moving Contractor's and Engineer's field offices and equipment required for first month operations onto Site.
4.    Installing temporary construction power, wiring, and lighting facilities.

5. Providing onsite Internet service to Contractor's and Engineer's field offices.
  6. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
  7. Arranging for and erection of Contractor's work and storage yard.
  8. Posting OSHA required notices and establishing safety programs and procedures.
  9. Having Contractor's superintendent at Site full time.
- B. Use area designated for Contractor's temporary facilities as shown on Drawings.

1.04 PROTECTION OF WORK AND PROPERTY

- A. Comply with Owner's safety rules while on Owner's property.
- B. Keep Owner informed of serious onsite accidents and related claims.
- C. Use of Explosives: No blasting or use of explosives will be allowed onsite.

**PART 2 PRODUCTS**

2.01 PROJECT SIGN

- A. Refer to Project Sign Detail in ADEM Supplementary General Conditions.

2.02 CONTRACTOR'S FIELD OFFICES

- A. Prefabricated or mobile units with serviceable finishes temperature controls, and foundations adequate for normal loading.
- B. Provide on-site office facilities for Contractor and subcontractors as appropriate to the stage and demands of the work.

2.03 ENGINEER'S FIELD OFFICES

- A. Prefabricated or mobile units with serviceable finishes temperature controls, and foundations adequate for normal loading.
- B. Provide on-site office facilities for Engineer independent from those of the Contractor's spaces and facilities and shall include two offices, common conference area, and restroom. Minimum 10-feet by 30-feet unit.

C. Engineer's office facility shall be accommodated with the following (all new and unused):

1. Two standard size desks, 30 inches by 60 inches with upholstered swivel arm chairs, and three drawers, with locks and keys.
2. One metal, 36 inches by 72 inches double-door storage cabinet with lock and keys.
3. Two 4-drawer legal size metal filing cabinets.
4. Two 36-inch by 68-inch metal book shelves.
5. One wastebasket per desk and table.
6. Two fire extinguishers.
7. One industrial first aid kit.
8. Outside thermometer and rain gauge.
9. Combination copier, scanner, and computer printer Xerox VersaLink C7000 or equal, complete with paper and supplies (toner and copy cartridges) for duration of Contract. Furnish maintenance contracts for service and repair of Xerox machine and network access effective for duration of the project.
10. Two miscellaneous tables, 3 feet by 6 feet.
11. Eight folding chairs.
12. One dry-erase board, 48 inches by 36 inches.
13. One dorm size refrigerator.
14. One microwave oven.
15. Provide potable water service to all trailer fixtures.
16. Provide sanitary facilities
17. Provide Internet access via a wireless local network with cable modem connection and internet access account (access may be shared with Contractor).

2.04 TEMPORARY CONTROL ROOM

- A. Provide on-site facilities for Owner's Temporary Control Room independent from those of the Contractor's facilities to include reallocation of a room within the existing Maintenance Building.
- B. Owner's Temporary Control Room shall be accommodated with the following (all new and unused):
1. One standard size desks, 30 inches by 60 inches with upholstered swivel arm chair, and three drawers, with lock and key.
  2. Two miscellaneous tables, 3 feet by 6 feet.
  3. Eight folding chairs.
  4. One dry-erase board, 48 inches by 36 inches.
  5. Provide plant communications system access and connectivity as specified.

2.05 PROJECT SIGN

- A. Refer to Project Sign Detail in ADEM Supplementary General Conditions.

**PART 3 EXECUTION**

3.01 TEMPORARY UTILITIES

- A. Power:
1. Electric power will be available at or near Site exclusive of power as needed for temporary bypass pumping. Determine type and amount available and make arrangements for obtaining temporary electric power service.
  2. Cost of electric power will be borne by Owner.
  3. Provide independent power source for bypass pumping as specified in Section 01 57 28, Temporary Flow Control.
- B. Lighting: Provide temporary lighting to meet applicable safety requirements to allow erection, application, or installation of materials and equipment, and observation or inspection of the Work.
- C. Water:
1. Contractor shall make temporary connections for construction water at Site at locations as coordinated with the Owner. Provide temporary facilities and piping required to bring water to point of use and remove when no longer needed. Notify fire department before obtaining water from fire hydrants.
  2. Water as reasonably necessary for the prosecution of the work shall be provided at no cost to the Contractor. If, in the opinion of the Engineer, the Contractor's water use is excessive or wasteful, Engineer may require the Contractor to install an acceptable metering device and pay for water used at Owner's current rate.
  3. Provide means to prevent water used for testing from flowing back into source pipeline.
- D. Sanitary and Personnel Facilities: Provide and maintain facilities for Contractor's employees, Subcontractors, and other onsite employers' employees. Service, clean, and maintain facilities and enclosures.
- E. Fire Protection: Furnish and maintain on Site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of NFPA 241.

### 3.02 PROTECTION OF WORK AND PROPERTY

#### A. General:

1. Maintain in continuous service existing oil and gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, site lighting, and other utilities encountered within the Work, unless other arrangements satisfactory to owners of said utilities have been made.
2. Where completion of the Work requires temporary or permanent removal or relocation of existing utility, coordinate activities with owner of said utility and perform work to their satisfaction. See Section 01 31 13, Project Coordination for additional coordination requirements.
3. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
4. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
5. In areas where Contractor's operations are adjacent to or near a utility, such as gas, telephone, television, electric power, water, sewer, or irrigation system, and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection have been made by Contractor.
6. Notify property owners and utility offices that may be affected by construction operation at least 2 days in advance: Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to Contractor's operation, notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear costs incurred.
7. Do not impair operation of existing wastewater treatment system. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, treatment facilities or other sewer structures. Prevent operations from interrupting operation of treatment facilities
8. Maintain original Site drainage wherever possible.

- B. Site Security: Provide and maintain additional temporary security fences as necessary to protect the Work and Contractor-furnished products not yet installed.

C. Trees and Plantings:

1. Protect from damage and preserve trees, shrubs, and other plants outside limits of the Work and within limits of the Work, which are designated on Drawings to remain undisturbed.
  - a. Where practical, tunnel beneath trees when on or near line of trench.
  - b. Employ hand excavation as necessary to prevent tree injury.
  - c. Do not stockpile materials or permit traffic within drip lines of trees.
  - d. Provide and maintain temporary barricades around trees.
  - e. Water vegetation as necessary to maintain health.
  - f. Cover temporarily exposed roots with wet burlap, and keep burlap moist until soil is replaced around roots.
  - g. No trees, except those specifically shown on Drawings to be removed, shall be removed without written approval of Engineer.
  - h. Dispose of removed trees in a legal manner off the Site.
2. Balling and burlapping of trees indicated for replacement shall conform to recommended specifications set forth in the American Standards for Nursery Stock, published by American Nursery and Landscape Association. Balls shall be firm and intact and made-balls will not be accepted. Handle ball and burlap trees by ball and not by top.
3. In event of damage to bark, trunks, limbs, or roots of plants that are not designated for removal, treat damage by corrective pruning, bark tracing, application of a heavy coating of tree paint, and other accepted horticultural and tree surgery practices.
4. Replace each plant that dies as a result of construction activities.

D. Existing Structures:

1. Where Contractor contemplates removal of small structures such as fences, signposts, and culverts that interfere with Contractor's operations, obtain approval of property owner and Engineer.
2. Replace items removed in their original location and a condition equal to or better than original.

E. Dewatering: Construct, maintain, and operate cofferdams, channels, flume drains, sumps, pumps, or other temporary diversion and protection works. Furnish materials required, install, maintain, and operate necessary pumping and other equipment for the environmentally safe removal and disposal of water from the various parts of the Work. Maintain foundations and parts of the Work free from water.



- F. Archaeological Finds: Should finds of an archaeological or paleontological nature be made within Site limits, immediately notify Owner and Engineer and proceed in accordance with General Conditions. Continue the Work in other areas without interruption.
- G. Endangered and Threatened Species:
  - 1. Take precautions necessary and prudent to protect native endangered and threatened flora and fauna.
  - 2. Notify Engineer of construction activities that might threaten endangered and threatened species or their habitats.
  - 3. Engineer will mark areas known as habitats of endangered and threatened species prior to commencement of onsite activities.
  - 4. Additional areas will be marked by Engineer as other habitats of endangered and threatened species become known during construction.

### 3.03 TEMPORARY CONTROLS

#### A. Air Pollution Control:

- 1. Minimize air pollution from construction operations.
- 2. Burning of waste materials, rubbish, or other debris will not be permitted on or adjacent to Site.
- 3. Conduct operations of dumping rock and of carrying rock away in trucks to cause a minimum of dust. Give unpaved streets, roads, detours, or haul roads used in construction area a dust-preventive treatment or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention. See Civil Drawings for additional requirements.
- 4. Provide and maintain temporary dust-tight partitions, bulkheads, or other protective devices during construction to permit normal operation of existing facilities. Construct partitions of plywood, insulating board, plastic sheets, or similar material. Construct partitions in such a manner that dust and dirt from demolition and cutting will not enter other parts of existing building or facilities. Remove temporary partitions as soon as need no longer exists.

#### B. Noise Control:

- 1. Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels.
- 2. Noise Control Plan: Propose plan to mitigate construction noise and to comply with noise control ordinances, including method of construction, equipment to be used, and acoustical treatments.

C. Water Pollution Control:

1. Divert sanitary sewage and nonstorm waste flow interfering with construction and requiring diversion to sanitary sewers. Do not cause or permit action to occur which would cause an overflow to existing waterway.
2. Prior to commencing excavation and construction, obtain Engineer's agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and dewatering pump discharges.
3. Comply with Section 01 57 13, Temporary Erosion and Sedimentation Control, for stormwater flow and surface runoff.
4. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

- D. Erosion, Sediment, and Flood Control: Provide, maintain, and operate temporary facilities as specified in Section 01 57 13, Temporary Erosion and Sedimentation Control, to control erosion and sediment releases, and to protect the Work and existing facilities from flooding during construction period.

3.04 TEMPORARY FIELD OFFICES

- A. Locate Contractor's and Engineer's facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Locate in an adjacent space in an area as indicated in the Drawings.
- B. Provide Contractor's facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Provide on-site office facilities for Engineer for the duration of the contract available commencing within thirty (30) days of any on-site work commencement. Remove at Engineer's direction not sooner than Substantial Completion nor later than 60 days after Substantial Completion
- D. Accommodate Owner's Temporary Control Room within the existing Maintenance Building as indicated in the Drawings prior to interruption of the use of the existing operations room in the Operations Building. Remove at Engineer's direction not sooner than activation of the new operations control room in the new Dewatering Building.
- E. Install temporary water service or connect to existing service. At Substantial Completion, restore these facilities to condition existing before initial use.

### 3.05 STORAGE YARDS AND BUILDINGS

- A. No area beyond that indicated by the drawings on Owner's property may be used for temporary facilities. Provide lands and access to lands for additionally needed temporary facilities for use by Contractor for duration of Project.
- B. Coordinate requirements with Section 01 61 00, Common Product Requirements.
- C. Temporary Storage Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions.
- D. Temporary Storage Buildings:
  - 1. Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored.
  - 2. Arrange or partition to provide security of contents and ready access for inspection and inventory.
  - 3. Store combustible materials (paints, solvents, fuels) in a well-ventilated and remote building meeting safety standards.

### 3.06 ACCESS ROADS

- A. Utilize existing access roads into the site and within the Site. Provide additional access routes within the site as required by the work.
- B. Maintain drainage ways. Install and maintain culverts to allow water to flow beneath access roads. Provide corrosion-resistant culvert pipe of adequate strength to resist construction loads.
- C. Provide gravel, crushed rock, or other stabilization material to permit access by all motor vehicles at all times.
- D. Maintain road grade and crown to eliminate potholes, rutting, and other irregularities that restrict access.
- E. Upon completion of construction, restore ground surface disturbed by access road construction to original grade.

3.07 PARKING AREAS

- A. Contractor may park up to two vehicles at the construction trailer. All other vehicle parking shall be restricted to the parking area on the northeast corner of the Site. Mules used to transport employees from offsite parking may be parked within the designated temporary facilities areas.
- B. Control vehicular parking to preclude interference with public traffic or parking, or access by emergency vehicles.

3.08 VEHICULAR TRAFFIC

- A. Comply with Laws and Regulations regarding closing or restricting use of public streets or highways. No public or private road shall be closed, except by written permission of proper authority. Ensure the least possible obstruction to traffic and normal commercial pursuits.
- B. Conduct the Work to interfere as little as possible with public travel, whether vehicular or pedestrian.
- C. Whenever it is necessary to cross, close, or obstruct roads, driveways, and walks, whether public or private, provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.

3.09 CLEANING DURING CONSTRUCTION

- A. In accordance with MAWSS's Standard Specifications, as may be specified in other Specification sections, and as required herein.
- B. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris. At least weekly, sweep floors (basins, tunnels, platforms, walkways, roof surfaces), and pick up and dispose of debris.
- C. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least weekly, dispose of such waste materials, debris, and rubbish offsite.
- D. Unless indicated otherwise at least weekly, brush sweep entry drive, roadways, and other streets and walkways affected by the Work and where adjacent to the Work.

**END OF SECTION**

**SECTION 01 57 13**  
**TEMPORARY EROSION AND SEDIMENT CONTROL**

**PART 1      GENERAL**

**1.01      SUMMARY OF WORK**

- A.    This section covers Work necessary for stabilization of soil to prevent erosion and sedimentation during construction and land disturbing activities. The Work shall include the furnishing of all labor, materials, tools, and equipment to perform the Work and services necessary as herein specified and as indicated on the Drawings. This shall include installation, maintenance, and final removal of all temporary soil erosion and sediment control measures and installation of permanent soil erosion control practices.
- B.    The minimum areas requiring soil erosion and sediment control measures are indicated on the Drawings. The right is reserved to modify the use, location, and quantities of soil erosion and sediment control measures based on activities of Contractor and as the Engineer considers to be to the best interest of the Owner.
- C.    See additional information show on the Drawings.
- D.    Erosion and sediment control practices shall comply with the “Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas,” latest edition.
- E.    Erosion and sediment control practices shall also comply with the “City of Mobile, Alabama Flood Plain Management Plan,” latest edition.

**1.02      DEFINITIONS**

- A.    BMP: Best management practice, means schedule of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, and waste disposal.
- B.    CBMPP: Construction Best Management Practice Plan prepared by the Contractor, as described and required by Alabama NPDES Permit ALR100000.
- C.    Certified Contractor: A person who has received training and is a certified professional to install/construct, inspect and maintain erosion and sediment control practices.

- D. City: City of Mobile.
- E. Clearing: Removal of interfering or objectionable material lying on or protruding above ground surface.
- F. Construction Exit: A stone stabilized pad located at any point where traffic will be leaving a construction site to a public right-of-way, street, alley, sidewalk, or parking area or any other area where there is a transition from bare soil to a paved area.
- G. ESC: Erosion and sediment control. Any temporary or permanent measures that prevent or reduce erosion, control sedimentation, and ensure that sediment does not leave a site.
- H. Land Disturbing Activity: Any activity that results in a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing soil topography. Land disturbing activities include, but are not limited to demolition, construction, clearing, grading, excavation and filling.
- I. Maintenance Period: Maintenance period begins immediately after each area is planted and shall continue for a period of 8 weeks after all seeding, sodding, and planting are completed.
- J. Project Limits: Areas, as shown or specified, within which Work is to be performed.
- K. Sediments: Soil, sand, and minerals washed from land into water, usually after a rain event.
- L. Standard Specifications: When referenced in this section, shall mean the current edition of the Alabama Department of Transportation Standard Specifications for Highway Construction.

#### 1.03 GENERAL

- A. All activities shall conform to the Alabama Handbook and the City of Mobile (City) requirements. In the event of a conflict, the more stringent requirement shall apply.
- B. Contractor must obtain a copy of the approved Tier 1 Land Disturbance permit prior to Construction.
- C. Contractor shall apply and comply with the following permits before construction begins:
  - 1. Alabama Department of Environmental Management: National Pollutant Discharge Elimination System (NPDES) General Permit Number ALR10000.

- D. Contractor shall implement and comply with the CBMPP specific for the Project.
- E. The site is within an Alabama Priority Watershed and as such, the Contractor shall comply with the associated special requirements for erosion and sedimentation control.
- F. Land disturbance activities shall not commence until the all permits listed above have been issue.
- G. Erosion and sediment control practices shall be installed prior to commencement of land disturbance activities.
- H. Prior to commencing land disturbance activities, the Contractor shall clearly and accurately demarcate the limits of land disturbance with clearing fence or other appropriate means, for the entire duration of the Project.
- I. No land disturbance shall occur outside the limits indicated in the Drawings, unless approved by the Engineer.
- J. After installation of the erosion and sediment control BMP's, the Contractor must contact the City and request a field inspection before proceeding with clearing, grading, utility installation, and Work.
- K. The location of some erosion and sediment control measures may have to be altered from those shown on the Drawings if drainage patterns during construction differ from the ones shown on the Drawings. Contractor is responsible to accomplish erosion and sediment control for all drainage patterns created during various stages of construction. Contractor shall report to the Engineer any difficulty in controlling erosion during any phase of construction.
- L. Soil erosion stabilization and sedimentation control consist of, but not limited to, the following elements:
  - 1. Conducting earthwork and excavation activities in such a manner to fit the topography soil type and condition.
  - 2. Implementation and continuous maintenance of BMP's.
  - 3. Minimize disturbed area and duration of exposure to erosion elements.
  - 4. Stabilize disturbed areas immediately:
    - a. Topsoil and seeding:
      - 1) Placement and maintenance of Temporary Seeding on all areas disturbed by construction.
      - 2) Placement of permanent topsoil, fertilizer, and seed, etc., in all areas not occupied by structures or pavement, unless shown otherwise.

- b. Soil Stabilization Seeding: Placement of fertilizer and seed, etc., in areas as specified hereinafter.
  - c. Plastic sheeting to protect slopes as indicated on the Drawings.
- 5. Construction or installation of temporary erosion control facilities such as, silt fences, check dams, diversion dikes, etc.
- 6. Construction or installation of permanent erosion control facilities such as, spreader swales, stormwater swales, rip-rap, permanent vegetation, etc.
- M. Contractor shall install and add to the erosion control measures during construction as determined by the Engineer or the Public Works Department.
- N. The Contractor shall be responsible for phasing Work in areas allocated for his exclusive use during this Project, including any proposed stockpile areas, to restrict sediment transport. This will include installation of any temporary erosion control devices, ditches, or other facilities.
- O. The areas set aside for the Contractor's use during the Project may be temporarily developed to provide satisfactory working, staging, and administrative areas for his exclusive use. Preparation of these areas shall be in accordance with other requirements contained within these Specifications and shall be done in a manner to both control all sediment transport away from the area.
- P. Contractor is responsible for maintaining all erosion control measures installed for the full duration of this Contract.
- Q. Contractor shall observe the approved Project sequence as indicated on the Drawings. The Contractor shall maintain careful scheduling and performance to ensure that the exposure of land area stripped of its natural cover is kept to a minimum.
- R. Mulch or temporary seeding or plastic sheeting over slopes shall be applied to all disturbed areas within 5 days of clearing. All disturbed areas that are stabilized with mulch shall be stabilized with temporary seeding after 14 days.
- S. Areas opened by construction operations and that are not anticipated to be re-excavated or dressed and received final grassing treatment within 14 days shall be temporary seeded with a quick growing grass species which will provide an early cover during the season in which it is planted and will not compete with the permanent grassing.
- T. Earthwork operations in the vicinity of water buffers and the lake shall be carefully controlled to avoid dumping or sloughing into the buffer or water.
- U. The Contractor shall maintain all elements, systems, and facilities of the Soil Erosion Stabilization and Sedimentation Control during this Project for the duration of his activities on this Project until permanent stabilization of the Site is achieved.



- V. Upon completion of construction, and after the site is stabilized, the Contractor shall remove all temporary erosion control measures and dispose of them, unless noted on the Drawings. Permanent sod shall be applied to the entire Site for all remaining area.
- W. Contractor shall inspect erosion and sediment control measures each day to ensure that they are working properly. Formal inspections made jointly by the Contractor and the Engineer or the Owner shall be conducted, at a minimum, every 2 weeks to evaluate the Contractor's conformance to the requirements of these Specifications and the Permit.
- X. All silt traps and spreader swales shall be cleaned of collected sediment after every storm event, and shall be immediately repaired or replaced if found to be defective. Cleaning shall be done in a manner that will not direct the sediment into the storm drain piping system. Removed sediment shall be taken to an area selected by the Engineer where it can be cleaned of sticks and debris, then allowed to dry. Final sediment and debris disposal shall be onsite as designated by Engineer.
- Y. Silt fence shall be inspected for depth of sediment, tears, to see if fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground. Built up sediment shall be removed from silt fence when it has reached one-half the height of the fence.
- Z. Temporary and permanent seeding and planting shall be inspected for bare spots, washouts, and healthy growth. All the permanent seeded grass cover areas shall be reworked and reseeded if 75 percent grass cover is not achieved within 14 days.
- AA. If full implementation of the approved Drawings does not provide for effective erosion and sediment control, additional measures shall be implemented as directed by the Engineer or the Owner.
- BB. Contractor's failure to install, operate and maintain all erosion and sediment control measures, to the satisfaction of the Engineer and the Owner, will result in all construction being stopped on the job until such measures are installed or returned to their proper functional condition.
- CC. A maintenance inspection report shall be made after each inspection by the Contractor. The reports will be kept onsite during construction and available upon request by the Owner, the Engineer, the County, or any Federal or Local Agency approving erosion and sediment control plans. This report shall be made and retained as part of the CBMPP for at least 3 years from the date that the site is finally stabilized and the Notice of Termination is submitted. The report shall identify any incidents of non-compliance.

#### 1.04 SUBMITTALS

- A. Submittals shall be made in accordance with Section 01 33 00, Submittal Procedures:
  - 1. Shop Drawings.
  - 2. Product Data.
- B. In addition, the Contractor shall provide the following specific information:
  - 1. Copy of CBMPP.
  - 2. Erosion and Sediment Control Plans identifying any field changes.
  - 3. Supporting calculations from any deviation from the approved ESC plans.
  - 4. Sequence and schedule of activities; such as ESC installation, ESC maintenance, site clearing, grading, construction activities, construction of utilities, infrastructure and buildings, final grading, and temporary and final stabilization and removal of all ESC measures. Schedule shall identify the expected date and duration of each activity.

### **PART 2 PRODUCTS**

#### 2.01 SILT FENCE

- A. As specified in the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas for Sediment Barrier Fence, Type B.

#### 2.02 PERMANENT SEED

- A. As specified in Section 32 92 00, Turf and Grasses.

#### 2.03 TEMPORARY SEED

- A. As specified in Section 32 92 00, Turf and Grasses.

#### 2.04 TOPSOIL

- A. Topsoil shall be as specified under Section 32 91 13, Soil Preparation.

#### 2.05 FERTILIZER

- A. As specified in Section 32 92 00, Turf and Grasses.

#### 2.06 LIME

- A. As specified in Section 32 91 13, Soil Preparation.

2.07 MULCH

- A. As specified in Section 31 32 00, Soil Stabilization.

2.08 EROSION CONTROL MATTING

- A. As specified in Section 31 32 00, Soil Stabilization.

2.09 GEOTEXTILES

- A. As specified in Section 31 32 19.16, Geotextile.

2.10 WATER FOR DUST CONTROL

- A. Free of hazardous or toxic contaminants.

2.11 STONE FOR ENTRANCE DRIVE TO SITE

- A. See Drawings.

**PART 3 EXECUTION**

3.01 GENERAL

- A. The Contractor shall install erosion and sediment control measures and maintain in accordance with the Drawings.
- B. The Contractor shall provide and maintain soil stabilization at all times.
- C. After installation of the initial erosion and sediment control measures, the Contractor shall schedule an inspection with the Engineer and the City's site inspector. No other construction activities shall occur until the Engineer approves the installation of the initial erosion and sediment control measures. If unforeseen conditions exist in the field that warrants the installation of additional erosion and sediment control measures, the Contractor must install any additional measures deemed necessary by the Engineer.
- D. Contractor shall observe the approved Project sequence. The Contractor shall maintain careful scheduling and performance to ensure that the exposure of land area stripped of its natural cover is kept to a minimum.
- E. Contractor shall be responsible for phasing Work in areas allocated for their exclusive use during Project, including proposed stockpile areas and installation of temporary erosion control devices, ditches, or other facilities.
- F. Engineer's acceptance of CBMPP required prior to starting earth disturbing activities.

3.02 SILT FENCE

- A. The Contractor shall construct silt fence in accordance with the “Alabama Handbook” and the City of Mobile where shown and at locations determined by the Engineer or the City.

3.03 SEEDING

A. General:

- 1. The Contractor shall give at least 3 days notice to the Engineer prior to seeding to allow for inspection of the areas. The Contractor shall rework any areas not approved for seeding to the Engineer’s satisfaction.
- 2. The Contractor shall keep the Engineer advised of schedule of operations.
- 3. Seed shall be clean, delivered in original unopened packages and bearing an analysis of the contents, guaranteed 95 percent pure with minimum germination rate of 85 percent.

- B. Schedules: Seeding shall be performed in accordance with the schedules shown on the approved Drawings.

C. Soil Stabilization and Temporary Seeding:

- 1. Soil stabilization seeding shall consist of the application of the following materials in quantities as further described herein for stockpiles and disturbed areas left inactive for more than 14 days.
  - a. Lime.
  - b. Fertilizer.
  - c. Seed.
  - d. Mulch.
  - e. Maintenance.
- 2. Hydroseeding will be permitted as an alternative method of applying seed and associated soil conditioning agents described above. Should the Contractor elect to apply soil stabilization seeding by hydroseeding methods, he shall submit his operational plan and methods to the Engineer.
- 3. Temporary Seeding is to be placed and maintained over all disturbed areas prior to Permanent Seeding. Maintain Temporary Seeding until such time as areas are approved for Permanent Seeding. As a minimum, maintenance shall include the following:
  - a. Fix-up and reseedling of bare areas or redisturbed areas.
  - b. Mowing for stands of grass or weeds exceeding 6 inches in height.

D. Topsoil and Permanent Seeding and Sod:

1. Topsoil and Permanent Seeding shall consist of the application of the following materials in quantities as further described herein:
  - a. 6-inch depth of topsoil.
  - b. Lime.
  - c. Fertilizer.
  - d. Permanent seed mix.
  - e. Mulch.
2. Topsoil is to be placed over all disturbed areas that are not surfaced with concrete, asphalt, or pavers.
3. Preparation:
  - a. After rough grading is completed and reviewed by the Engineer, Contractor shall spread topsoil as hereinbefore specified over all areas to receive Permanent Seeding to a minimum compacted depth of 6 inches with surface elevations as shown. Loosen the finished surface to a depth of 2 inches and leave in smooth condition, free from depressions or humps, ready for seeding.
  - b. Finish Grading:
    - 1) Contractor shall rake the topsoiled area to a uniform grade, so that all areas drain as indicated on the grading plan.
    - 2) Contractor shall remove all trash and stones exceeding 1 inch in diameter from area to a depth of 2 inches.
4. Permanent Sod: After soil has been scarified, apply sod and other products as specified in the Section 32 92 00, Turf and Grasses.
5. Maintenance:
  - a. Maintenance Period: Contractor shall begin maintenance immediately after each portion of permanent grass is planted and continue for 8 weeks after all planting is completed.
  - b. Maintenance Operations: Contractor shall water to keep surface soil moist. Repair washed out areas by filling with topsoil, liming, fertilizing, and seeding. Replace mulch on banks when washed or blown away. Mow to 2 inches after grass reaches 3 inches in height, and mow frequently enough to keep grass from exceeding 3-1/2 inches. Weed by local spot application of selective herbicide only after first planting season when grass is established.
6. Guarantee:
  - a. If, at the end of the 8-week maintenance period, a satisfactory stand of grass has not been produced, the Contractor shall renovate and reseed the grass or unsatisfactory portions thereof immediately, or, if after October 15 during the next planting season. If a satisfactory stand of grass develops by July 1 of the following year, it will be accepted. If it is not accepted, a complete replanting will be required during the planting season meeting all of the requirements specified under paragraph Permanent Seed.

- b. A satisfactory stand is defined as grass or section of grass that has a substantial establishment of new grass, strongly rooted, and uniformly green in appearance from a distance of 50 feet and which covers 75 percent or more of the grassed area. No noticeable thin or bare areas as determined by the Engineer.

### 3.04 CLEARING LIMIT

- A. Before beginning clearing and grubbing operations, install silt fence at limits of clearing.
- B. Drive posts a minimum of 18 inches into ground at maximum spacing of 6 feet.
- C. Remove after permanent stabilization is complete and accepted by Engineer.

### 3.05 SOIL STOCKPILES

- A. Protect from erosion with silt fence.
- B. Seed stockpile, not active for 14 days, with soil stabilization seed, surrounded by silt fence and a permanent 2-foot minimum depth perimeter ditch located within 10 feet of the toe of stockpile slope.
- C. Sediment transport and erosion from working stockpiles shall be controlled and restricted from moving beyond immediate stockpile area by construction of temporary toe-of-slope ditches and accompanying silt fences, as necessary. Keep these temporary facilities in operational condition by regular cleaning, regrading, and maintenance.

### 3.06 EROSION CONTROL MAT

- A. Provide and install as specified in Section 31 32 00, Soil Stabilization.

### 3.07 GEOTEXTILES

- A. Installed where shown on the Drawings and as specified in Section 31 32 19.16, Geotextile.

### 3.08 DUST CONTROL

- A. Contractor shall control, at all times, surface and air movement of dust.
- B. Sprinkler site with water until the surface is wet. Repeat as needed.

3.09 FIELD QUALITY

- A. Conduct inspections jointly with Engineer and/or the City every 2 weeks to evaluate conformance to requirements of Specifications, the Drawings, and the CBMPP.
- B. Replace or repair failed or overloaded silt fences, check dams, or other temporary erosion control devices within 2 days after receiving written notice from Engineer and/or City.

3.10 MAINTENANCE OF EROSION AND SEDIMENT CONTROL MEASURES

- A. Erosion and sediment control measures shall be maintained at all times until permanent stabilization of the Site is achieved.
- B. Erosion and sediment control measures shall be checked after each rain event, and shall be immediately repaired or replaced if found to be defective. A record shall be maintained of all inspections, repairs and replacement.
- C. Contractor shall inspect erosion and sediment control measures each day to ensure that they are working properly.
- D. Construction exit shall be top dressed with additional material periodically to maintain minimum depth of 6 inches. All materials spilled, dropped, washed, or tracked from vehicles or site onto roadways or into storm drains must be removed immediately.
- E. Silt fence shall be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground. Build up sediment shall be removed from silt fence when it has reached one-half the height of the fence.
- F. Each BMP is to be maintained or replaced if the accumulated sediment depth is equal to or greater than one-half of the capacity of the device. Reference marks denoting the elevation at which each device is to be maintained shall be placed on all devices.
- G. Temporary and permanent seeding, sodding, and planting shall be inspected for bare spots, washouts, and healthy growth. All the permanent seeded grass cover areas shall be reworked and reseeded if 75 percent grass cover is not achieved within 14 days.
- H. If full implementation of the approved Drawings does not provide for effective erosion and sediment control, additional ESC measures shall be implemented as directed by the Engineer or the City.

- I. A maintenance inspection report shall be made after each inspection by the Contractor. The reports will be kept onsite during construction and available upon request by the Engineer, Owner, or any Federal, State, or Local Agency. The report shall identify any incidents of non-compliance.
- J. Contractor shall installed and add to erosion control measures as determined by the Engineer or the Owner.
- K. The Contractor shall maintain all elements of the ESC measures and facilities to be constructed during this Project for the duration of his activities on this Project. Formal inspections made jointly by the Contractor and the Engineer shall be conducted every 2 weeks to evaluate the Contractor's conformance to the Approved Drawings and this Specification.
- L. All silt traps shall be cleaned of collected sediment after every storm or as determined from the biweekly inspections. Cleaning shall be done in a manner that will not direct the sediment into the storm drain piping system. Removed sediment shall be taken to an area selected by the Engineer where it can be cleaned of sticks and debris, then allowed to dry. Final sediment and debris disposal shall be onsite as designated by Engineer.
- M. Replacement or repair of failed or overloaded silt fences, check dams, or other temporary erosion control devices shall be accomplished by the Contractor within 2 days after receiving written notice from the Engineer.
- N. Unpaved earth drainage ditches shall be regraded as needed to maintain original grade and remove sediment buildup. If a ditch becomes difficult to maintain, the Contractor shall cooperate with the Engineer and install additional erosion control devices such as check dams, temporary paving, or silt fences as directed by the Engineer.
- O. If the Contractor has not complied with any of the above maintenance efforts to the satisfaction of the Engineer within 2 working days after receiving written notification from the Engineer, the Owner shall have the prerogative of engaging others to perform any needed maintenance or cleanup, including removal of accumulated sediment at constructed erosion control facilities, at Contractor's expense.

### 3.11 CLEANING

- A. Dress sediment deposits remaining after fence has been removed to conform to existing grade. Prepare and seed graded area.

### **END OF SECTION**



**SECTION 01 57 28**  
**TEMPORARY FLOW CONTROL**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
  - 1.    Institute of Inspection, Cleaning, and Restoration Certification (IICRC): S500, Standard and Reference Guide for Professional Water Damage Restoration.

**1.02      DEFINITIONS**

- A.    Bypass Pumping: Temporary flow control accomplished by diverting flow away from the Work area using one or more pumps.
- B.    Temporary Flow Control: Reducing, limiting, or excluding flow in or to a sanitary sewer, storm sewer, pump station, force main, or other facility as required for performing the Work under the Contract. Draining, handling, and disposal of sanitary sewage, process flows and stormwater from pipelines and other facilities as required for performing the Work under the Contract is also part of temporary flow control.
- C.    Temporary Flow Control Plan: Plan prepared by Contractor containing complete information on how Contractor proposes to perform temporary flow control in accordance with specified requirements.

**1.03      SYSTEM DESCRIPTION**

- A.    Provide facilities and controls required to intercept, convey, and discharge flow to be controlled; include standby and emergency equipment.
- B.    Conform to regulatory requirements.
- C.    Protect water resources, wetlands, and other natural resources.
- D.    Temporary flow control shall be done in a manner that will not damage private or public property, or create a nuisance or public menace. Flow shall be conveyed in enclosed pipes that are adequately protected from traffic or other hazards.

E. Discharge:

1. To sanitary sewer system or process basin receiving the flows prior to the diversion.
2. Dumping or free flow on private or public property, gutters, streets, or sidewalks is prohibited.
3. Discharge of sanitary sewage to storm sewers, to surface waters or wetlands, or into the ground, is prohibited.

1.04 SITE CONDITIONS

- A. Existing facilities in vicinity of bypass area are shown on Drawings or included in referenced documents.
- B. Minimize impact to Site and process component accessibility required by bypass pumping system installation and operation.

1.05 SUBMITTALS

A. Informational Submittals:

1. Temporary Flow Control Plan.
2. Emergency Cleanup Plan.
3. Special permits required for temporary flow control.
4. Names and qualifications of industrial hygienist and standby cleanup Subcontractor, including but not limited to, certification by IICRC.
5. Information describing equipment and materials to be used and showing conformance with specified requirements.

1.06 QUALITY ASSURANCE

A. Qualifications:

1. Industrial Hygienist and Cleanup Subcontractor: Certified by IICRC.
2. Temporary Flow Control System Designer: Professional engineer who has at least 5 years' experience in design of such systems and who is registered in the State of Alabama.

- B. Regulatory Requirements: Comply with any applicable ADEM and City of Mobile requirements.

## 1.07 PERFORMANCE REQUIREMENTS

### A. General:

1. It is essential to operate the existing treatment facility without interruption of service throughout the project duration.
2. During modification of the existing facility that interrupt normal flow patterns; provide, operate, and maintain temporary facilities such as dams, plugs, pumping equipment, piping and necessary power to intercept all sewage and/or process flows before it reaches a point where it would interfere with the work.
3. Maintain flows around the work area in such a manner that will not cause surcharging of sewers, damage to sewers, and that will prevent public and private property from damage.
4. Where bypassing of process flows using bypass piping without pumping is required, provide bypass piping of equal or greater size of the interrupted main. For pressure mains, size and route the bypass main to preclude addition of head losses to the interrupted main.
5. Where bypassing of process flows using bypass pumping is required, provide pumping capacity (exclusive of spare bypass pumps) of at least equal to the combined capacity of the pumps contributing to the flow in the main being interrupted exclusive of spare process pumps. Where the interrupted main is a gravity-fed force main, provide bypass pumping equal to the flow rate of the main flowing full at 6 feet per second velocity.
6. Where bypassing of the plant sewer is required, provide pumping capacity (exclusive of spare bypass pumps) of at least the lesser of the interrupted main flowing full at 6 feet per second velocity or the calculated combined flow rate from 75 percent of the plumbing fixtures upstream of the interruption.

### B. Anticipated Bypass Requirements:

1. Bypass pumping may be required depending upon the Contractor's sequence of operations to include the following:
  - a. The gravity sewers associated with the Administration Building, Maintenance Building and Blower Building during the reconfiguration of the plant sewer system.
  - b. Others to be determined.

## 1.08 SEQUENCING AND SCHEDULING

- ### A.
- Schedule and sequence bypass operations to coordinate with the other work to minimize the duration of bypass operations.

- B. Where practical, limit bypass operations to daytime hours.
- C. Bypass operations must be continuously monitored exclusive of off-site electronic monitoring.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**3.01 GENERAL REQUIREMENTS**

- A. Install temporary flow control facilities only within Owner's property.
- B. Operate and maintain temporary flow control 24 hours per day, 7 days per week, including without limitation, holidays, as required to control flows.
- C. Promptly remove temporary flow control facilities as soon as they are no longer needed.

**3.02 REQUIRED TEMPORARY FLOW CONTROL**

- A. Eliminate flow from sewer manhole to manhole segments during manhole construction or modification and connection of new branch piping within that segment.

**3.03 EQUIPMENT AND MATERIALS**

- A. General:
  - 1. Provide materials and equipment that will ensure continuous and successful operation of temporary flow control systems.
  - 2. Repair or modify systems as necessary.
  - 3. Unless otherwise shown or specified, materials and equipment may be new or used at Contractor's option.
- B. Plugs:
  - 1. Provide with taps for connection of pressure gauges and air hoses, and flow-through capability.
  - 2. Pipe Diameters 24 Inches and Smaller: Use mechanical plugs with rubber gaskets or pneumatic plugs with rubber boots.
  - 3. Pipe Diameters Larger than 24 Inches:
    - a. Use inflatable bag stoppers made in two or more pieces.
    - b. Manufacturers:
      - 1) Lansas.
      - 2) Cherne Industries.

C. Pumps:

1. Fully automatic, self-priming units that do not require use of foot valves or vacuum pumps in priming system.
2. Solids handling design with ability to pump minimum 3-inch diameter sphere.
3. Able to run dry for long periods of time to accommodate cyclical nature of flows.
4. Engine: Equipped to minimize noise. Noise levels shall not exceed 86 dBA at a distance of 50 feet from source.

D. Electric Power Generators:

1. Be able to simultaneously start and run electric powered pumps required for flow to be controlled.
2. Equipped to minimize noise. Noise levels shall not exceed 86 dBA at a distance of 50 feet from source.
3. Include automatic transfer switch if flow control system is to operate unattended.

E. Standby Equipment:

1. Standby Pump: One of each size to be available onsite.
2. Electric Power Generators: Minimum of one if temporary flow control system contains electric powered pump. Able to simultaneously start and run electric powered pumps required for flow to be controlled.

3.04 TEMPORARY FLOW CONTROL PLAN

A. Prepare and submit Temporary Flow Control Plan at least 60 days before starting the Work requiring temporary flow control; include following information:

1. Drawings indicating location of temporary sewer plugs and bypass discharge lines.
2. Traffic Control Plan specifically applicable to temporary flow control adhering to requirements of applicable agencies and as may be specified in Contract Documents.
3. Locations where flow will be intercepted and discharged.
4. If trucks are to be employed include the following:
  - a. Numbers and sizes of trucks.
  - b. Configuration of facilities to be used to load trucks at each interception location.
  - c. Locations where trucks will unload.
  - d. Time for loading, unloading, and travel.

5. Complete descriptions and performance characteristics of pumps, electric power generators, and standby equipment.
6. Acoustical information for equipment to be used showing compliance with noise control requirements of Section 01 50 00, Temporary Facilities and Control.
7. Details of temporary force mains, including horizontal and vertical alignments, pipe materials, protection of existing buried and aboveground facilities and improvements, maintenance of traffic and access to properties.
8. Design calculations proving adequacy of temporary system and selected equipment to convey all flows.
9. Drawings showing layouts and configurations of temporary flow control facilities and also showing locations relative to right-of-way easement, and property boundaries.
10. Drawings and design calculations of temporary bulkheads and plugs.
11. Drawings and design calculations for thrust restraint of temporary piping.
12. Details of system controls and control logic; include diagrams and narrative.
13. Anticipated schedule for the Work.
14. Other information to completely describe temporary flow control facilities and conformance to specified requirements.
15. Anticipate coordination needs with Owner's staff.

### 3.05 EMERGENCY CLEANUP PLAN

- A. Prepare and submit not less than 60 days before scheduled date of temporary flow control activities. As a minimum plan shall include the following:
  1. Procedures for removal of water.
  2. Procedures for determining nature and extent of damage and required restoration where restoration is possible.
  3. Provide for industrial hygienist and standby Subcontractor for cleanup of exterior and building interior spaces that might be affected by a spill, backup, or overflow. Industrial hygienist and cleanup Subcontractor shall be certified by IICRC and follow IICRC S500 for cleanup of Category 3 water.
- B. Implement for Full Scale Test and during temporary flow control.

### 3.06 TEMPORARY SANITARY SEWAGE FLOW REDUCTION

- A. Contractor shall be responsible for control of flows and under no circumstances be entitled to rely on flow reduction or curtailment by Owner.

3.07 DRAINING EXISTING PIPELINE

- A. Before initiating shutdown, ensure required materials, equipment, and labor are available onsite. Excavate and expose portions of existing pipeline to be removed.
- B. Provide tap and piping in place to drain sewage/process flows from existing pipeline before it is cut and to capture contents that may drain out when pipe is cut or capture flows at the downstream end of the isolated section.
- C. Sewage/process flows drained from mains shall be conveyed and discharged to downstream sewer or process main or basin.

3.08 FIELD QUALITY CONTROL

- A. Hydrostatic Pressure Test for Pump Bypass Systems:
  - 1. Prior to operation, test each section of discharge piping with maximum pressure equal to 1.5 times maximum operating pressure of system.
  - 2. Notify Engineer 24 hours prior to testing.
- B. Full Scale Test:
  - 1. At least 4 days prior to test, notify Engineer of date and time of test.
  - 2. Do not begin temporary flow control activities until successful test has been completed.
  - 3. Conduct on proposed temporary flow control at least 4 days before scheduled date of actual proposed temporary flow control.
  - 4. Purpose of test is to demonstrate capability, function, and reliability of Contractor's proposed method of temporary flow control.
  - 5. Duration: Minimum of 3 hours.
  - 6. Conduct between 8 a.m. and 4 p.m. Do not conduct test on Saturday, Sunday, or holiday.
  - 7. If electric pumps are being used, provide standby generators to ensure continuity of pumping operation in event of power failure.
  - 8. Demonstrate system controls and operation, reliability, and transfer to standby equipment during test.
  - 9. Conduct until flow is accommodated for minimum specified test duration.

10. Failure:
  - a. Test shall be deemed to have failed if during test flows are not accommodated for whatever reason and for whatever length of time.
  - b. If test fails, determine and correct deficiencies that caused test to fail and conduct another Full Scale Test.
11. Determination by Engineer of a successful test, permission by Engineer to proceed with the Work requiring temporary flow control, or anything else shall not relieve Contractor from responsibility to provide temporary flow control.

**END OF SECTION**



**SECTION 01 61 00  
COMMON PRODUCT REQUIREMENTS**

**PART 1      GENERAL**

**1.01      DEFINITIONS**

**A.      Products:**

1.      New items for incorporation in the Work, whether purchased by Contractor or Owner for the Project, or taken from previously purchased stock, and may also include existing materials or components required for reuse.
2.      Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change meaning of such other terms used in Contract Documents, as those terms are self-explanatory and have well recognized meanings in construction industry.
3.      Items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of the date of the Contract Documents.

**1.02      DESIGN REQUIREMENTS**

- A.      Where Contractor design is specified, design of installation, systems, equipment, and components, including supports and anchorage, shall be in accordance with provisions as indicated in the Drawings, with the Building Code of the City of Mobile, with the Occupational Safety and Health Administration and with all other applicable state and local agency requirements.
- B.      Where Contractor design is specified; installation, systems, equipment, and components shall be designed by a qualified professional Engineer registered in the State of Alabama.

**1.03      ENVIRONMENTAL REQUIREMENTS**

- A.      Altitude: Provide materials and equipment suitable for installation and operation under rated conditions at 50 feet above sea level.
- B.      Provide equipment and devices installed outdoors or in unheated enclosures capable of continuous operation within an ambient temperature range of 10 degrees F to 105 degrees F.

#### 1.04 PREPARATION FOR SHIPMENT

- A. When practical, factory assemble products. Mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable protective coating.
- B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and Contractor, equipment number, and approximate weight. Include complete packing list and bill of materials with each shipment.
- C. Extra Materials, Special Tools, Test Equipment, and Expendables:
  - 1. Furnish as required by individual Specifications.
  - 2. Schedule:
    - a. Ensure that shipment and delivery occurs concurrent with shipment of associated equipment.
    - b. Transfer to Owner shall occur immediately subsequent to Contractor's acceptance of equipment from Supplier.
  - 3. Packaging and Shipment:
    - a. Package and ship extra materials and special tools to avoid damage during long term storage in original cartons insofar as possible, or in appropriately sized, hinged-cover, wood, plastic, or metal box.
    - b. Prominently displayed on each package, the following:
      - 1) Manufacturer's part nomenclature and number, consistent with Operation and Maintenance Manual identification system.
      - 2) Applicable equipment description.
      - 3) Quantity of parts in package.
      - 4) Equipment manufacturer.
  - 4. Deliver materials to site or other area as designated by the Contractor.
  - 5. Notify Engineer, Owner, and Construction Manager upon arrival for transfer of materials.
  - 6. Replace extra materials and special tools found to be damaged or otherwise inoperable at time of transfer to Owner.
- D. Request a minimum 7-day advance notice of shipment from manufacturer. Upon receipt of manufacturer's advance notice of shipment, promptly notify Engineer of anticipated date and place of delivery.
- E. Factory Test Results: Reviewed and accepted by Engineer before product shipment as required in individual Specification sections.

1.05 DELIVERY AND INSPECTION

- A. Deliver products in accordance with accepted current Progress Schedule and coordinate to avoid conflict with the Work and conditions at Site. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.
- B. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label, date of manufacture and shelf life, where applicable.
- C. Unload products in accordance with manufacturer's instructions for unloading or as specified. Record receipt of products at Site. Promptly inspect for completeness and evidence of damage during shipment.
- D. Remove damaged products from Site and expedite delivery of identical new undamaged products, and remedy incomplete or lost products to provide that specified, so as not to delay progress of the Work.

1.06 HANDLING, STORAGE, AND PROTECTION

- A. Handle and store products in accordance with manufacturer's written instructions and in a manner to prevent damage. Store in approved storage yards or sheds provided in accordance with Section 01 50 00, Temporary Facilities and Controls. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by Owner.
- B. Manufacturer's instructions for material requiring special handling, storage, or protection shall be provided prior to delivery of material.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to ensure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered, but not installed in the Work.
- D. Store electrical, instrumentation, and control products, and equipment with bearings in weather-tight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulate against moisture, water, and dust damage. Connect and operate continuously space heaters furnished in electrical equipment.

- E. Store fabricated products above ground on blocking or skids, and prevent soiling or staining. Store loose granular materials in well-drained area on solid surface to prevent mixing with foreign matter. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
- F. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity.
- G. After installation, provide coverings to protect products from damage due to traffic and construction operations. Remove coverings when no longer needed.
- H. Hazardous Materials: Prevent contamination of personnel, storage area, and Site. Meet requirements of product specification, codes, and manufacturer's instructions.

## **PART 2 PRODUCTS**

### **2.01 GENERAL**

- A. Provide manufacturer's standard materials suitable for service conditions, unless otherwise specified in the individual Specifications.
- B. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.
- C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions in same or similar manner.
- D. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- E. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
- F. Equipment, Components, Systems, and Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable OSHA, state, and local health and safety regulations.

- G. Regulatory Requirement: Coating materials shall meet federal, state, and local requirements limiting the emission of volatile organic compounds and for worker exposure.
- H. Safety Guards: Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal. Use 16-gauge or heavier; galvanized steel, aluminum coated steel, or galvanized or aluminum coated 1/2-inch mesh expanded steel. Provide galvanized steel accessories and supports, including bolts. For outdoors application, prevent entrance of rain and dripping water.
- I. Authority Having Jurisdiction (AHJ):
  - 1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
  - 2. Materials and equipment manufactured within the scope of standards published by Underwriters Laboratories, Inc. shall conform to those standards and shall have an applied UL listing mark.
- J. Equipment Finish:
  - 1. Provide manufacturer's standard finish and color, except where specific color is indicated.
  - 2. If manufacturer has no standard color, provide equipment with finish as approved by Owner.
- K. Special Tools and Accessories: Furnish to Owner, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to, adequate oil and grease (as required for first lubrication of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts as required for maintenance.
- L. Lubricant: Provide initial lubricant recommended by equipment manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, startup, and operation until final acceptance by Owner.

- M. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.
  - 1. Use or reuse of components and materials without a traceable certification is prohibited.

## 2.02 FABRICATION AND MANUFACTURE

### A. General:

- 1. Manufacture parts to U.S.A. standard sizes and gauges.
- 2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
- 3. Design structural members for anticipated shock and vibratory loads.
- 4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
- 5. Modify standard products as necessary to meet performance Specifications.

### B. Lubrication System:

- 1. Require no more than weekly attention during continuous operation.
- 2. Convenient and accessible; oil drains with bronze or stainless steel valves and fill-plugs easily accessible from the normal operating area or platform. Locate drains to allow convenient collection of oil during oil changes without removing equipment from its installed position.
- 3. Provide constant-level oilers or oil level indicators for oil lubrication systems.
- 4. For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.

## 2.03 SOURCE QUALITY CONTROL

- A. Where Specifications call for factory testing to be witnessed by Engineer, notify Engineer not less than 14 days prior to scheduled test date, unless otherwise specified.

- B. Calibration Instruments: Bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- C. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

### **PART 3 EXECUTION**

#### **3.01 INSPECTION**

- A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing such effects. Remove damaged material or equipment from the Site and expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage that necessitates procurement of new products will be considered delays within Contractor's control.

#### **3.02 MANUFACTURER'S CERTIFICATE OF COMPLIANCE**

- A. With all manufactured components, a Manufacturer's Certificate of Compliance, a copy of which is attached to this section, shall be completed in full, signed by entity supplying the product, material, or service, and submitted prior to shipment of product or material or execution of the services.
- B. Engineer may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.
- C. Such form shall certify proposed product, material, or service complies with that specified. Attach supporting reference data, affidavits, and certifications as appropriate.
- D. May reflect recent or previous test results on material or product, if acceptable to Engineer.

#### **3.03 INSTALLATION**

- A. Equipment Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. No shimming between machined surfaces is allowed.
- C. Install the Work in accordance with NECA Standard of Installation, unless otherwise specified.

- D. Repaint painted surfaces that are damaged prior to equipment acceptance.
- E. Do not cut or notch any structural member or building surface without specific approval of Engineer.
- F. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions, and as may be specified. Retain a copy of manufacturers' instruction at Site, available for review at all times.
- G. For material and equipment specifically indicated or specified to be reused in the Work:
  - 1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
  - 2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such Work in the Contract Price.

3.04 FIELD FINISHING

- A. In accordance with Section 09 90 00, Painting and Coating, and individual Specification sections.

3.05 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

3.06 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

3.07 SUPPLEMENTS

- A. The supplement listed below, following "End of Section", is part of this Specification.
  - 1. Form: Manufacturer's Certificate of Compliance.

**END OF SECTION**



**MANUFACTURER'S CERTIFICATE OF COMPLIANCE**

OWNER: \_\_\_\_\_ PRODUCT, MATERIAL, OR SERVICE  
PROJECT NAME: \_\_\_\_\_ SUBMITTED: \_\_\_\_\_  
PROJECT NO: \_\_\_\_\_

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I hereby certify that the above-referenced product, material, or service called for by the Contract for the named Project will be furnished in accordance with all applicable requirements. I further certify that the product, material, or service are of the quality specified and conform in all respects with the Contract requirements, and are in the quantity shown. I further certify that we have examined the Plans and Specifications for this Project and have ascertained that this equipment or material is suitable for the purpose and use intended.

Date of Execution: \_\_\_\_\_, 20\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Manufacturer's Authorized Representative (*print*): \_\_\_\_\_

\_\_\_\_\_  
(Authorized Signature)



**SECTION 01 77 00  
CLOSEOUT PROCEDURES**

**PART 1      GENERAL**

**1.01      SUBMITTALS**

**A.      Informational Submittals:**

1.      Submit prior to application for final payment.
  - a.      Record Documents: As required in General Conditions.
  - b.      Special bonds, Special Guarantees, and Service Agreements.
  - c.      Consent of Surety to Final Payment: As required in General Conditions.
  - d.      Releases or Waivers of Liens and Claims: As required in General Conditions.
  - e.      Releases from Agreements.
  - f.      Final Application for Payment: Submit in accordance with procedures and requirements stated in Section 01 29 00, Payment Procedures.
  - g.      Extra Materials: As required by individual Specification sections.

**1.02      RECORD DOCUMENTS**

**A.      Quality Assurance:**

1.      Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.
2.      Accuracy of Records:
  - a.      Coordinate changes within record documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
  - b.      Purpose of Project record documents is to document factual information regarding aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive Site measurement, investigation, and examination.
3.      Make entries within 24 hours after receipt of information that a change in the Work has occurred.
4.      Prior to submitting each request for progress payment, request Engineer's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in a deferral by Engineer to recommend whole or any part of Contractor's Application for Payment, either partial or final.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**3.01 MAINTENANCE OF RECORD DOCUMENTS**

**A. General:**

1. Promptly following commencement of Contract Times, secure from Engineer at no cost to Contractor, one complete set of Contract Documents In electronic format for Contractor's printing and use.
2. Print one full size set of contract drawings for "Record Drawing" markup.
3. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.
4. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.

**B. Preservation:**

1. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
2. Make documents and Samples available at all times for observation by Engineer.

**C. Making Entries on Drawings:**

1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
  - a. Color Coding:
    - 1) Green when showing information deleted from Drawings.
    - 2) Red when showing information added to Drawings.
    - 3) Blue and circled in blue to show notes.
2. Date entries.
3. Call attention to entry by "cloud" drawn around area or areas affected.
4. Legibly mark to record actual changes made during construction, including, but not limited to:
  - a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.
  - b. Horizontal and vertical locations of existing and new Underground Facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.

- c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
  - d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
  - e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, and Engineer's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
5. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
- a. Clearly identify the item by accurate note such as "cast iron drain," "galv. water," and the like.
  - b. Show, by symbol or note, vertical location of item ("under slab," "in ceiling plenum," "exposed," and the like).
  - c. Make identification so descriptive that it may be related reliably to Specifications.

### 3.02 FINAL CLEANING

- A. At completion of the Work or of a part thereof and immediately prior to Contractor's request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to Contractor's notice of completion, clean entire Site or parts thereof, as applicable.
- 1. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to Owner and Engineer.
  - 2. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.
  - 3. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.
  - 4. Clean all windows.
  - 5. Clean and wax wood, vinyl, or painted floors.
  - 6. Broom clean exterior paved driveways and parking areas.
  - 7. Hose clean sidewalks, loading areas, and others contiguous with principal structures.
  - 8. Rake clean all other surfaces.
  - 9. Remove snow and ice from access to buildings.
  - 10. Replace air-handling filters and clean ducts, blowers, and coils of ventilation units operated during construction.
  - 11. Leave water courses, gutters, and ditches open and clean.

- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

**END OF SECTION**

**SECTION 01 78 23**  
**OPERATION AND MAINTENANCE DATA**

**PART 1      GENERAL**

**1.01      SECTION INCLUDES**

- A. Detailed information for the preparation, submission, and Engineer's review of Operations and Maintenance (O&M) Data, as required by individual Specification sections.

**1.02      DEFINITIONS**

- A. Preliminary Data: Initial and subsequent submissions for Engineer's review.
- B. Final Data: Engineer-accepted data, submitted as specified herein.
- C. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.

**1.03      SEQUENCING AND SCHEDULING**

- A. Equipment and System Data:
  - 1. Preliminary Data:
    - a. Do not submit until Shop Drawing for equipment or system has been reviewed and approved by Engineer.
    - b. Submit prior to shipment date.
  - 2. Final Data: Submit Instructional Manual Formatted data not less than 30 days prior to installation of equipment or system. Submit Compilation Formatted and Electronic Media Formatted data prior to Substantial Completion of Project.
- B. Materials and Finishes Data:
  - 1. Preliminary Data: Submit at least 15 days prior to request for final inspection.
  - 2. Final Data: Submit within 10 days after final inspection.

#### 1.04 DATA FORMAT

- A. Prepare preliminary and final data in the form of an instructional manual. Prepare final data on electronic media.
- B. Instructional Manual Format:
  - 1. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
  - 2. Size: 8-1/2 inches by 11 inches, minimum.
  - 3. Cover: Identify manual with typed or printed title "OPERATION AND MAINTENANCE DATA" and list:
    - a. Project title.
    - b. Designate applicable system, equipment, material, or finish.
    - c. Identity of separate structure as applicable.
    - d. Identify volume number if more than one volume.
    - e. Identity of equipment number and Specification section.
  - 4. Spine:
    - a. Project title.
    - b. Identify volume number if more than one volume.
  - 5. Title Page:
    - a. Contractor name, address, and telephone number.
    - b. Subcontractor, Supplier, installer, or maintenance contractor's name, address, and telephone number, as appropriate.
      - 1) Identify area of responsibility of each.
      - 2) Provide name and telephone number of local source of supply for parts and replacement.
  - 6. Table of Contents:
    - a. Neatly typewritten and arranged in systematic order with consecutive page numbers.
    - b. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
  - 7. Paper: 20-pound minimum, white for typed pages.
  - 8. Text: Manufacturer's printed data, or neatly typewritten.
  - 9. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
  - 10. Material shall be suitable for reproduction, with quality equal to original. Photocopying of material will be acceptable, except for material containing photographs.



C. Electronic Media Format:

1. Portable Document Format (PDF):
  - a. After all preliminary data has been found to be acceptable to Engineer, submit Operation and Maintenance data in PDF format on CD.
  - b. Files to be exact duplicates of Engineer-accepted preliminary data. Arrange by specification number and name.
  - c. Files to be fully functional and viewable in most recent version of Adobe Acrobat.

1.05 SUBMITTALS

A. Informational:

1. Data Outline: Submit two copies of a detailed outline of proposed organization and contents of Final Data prior to preparation of Preliminary Data.
2. Preliminary Data:
  - a. Submit three copies for Engineer's review.
  - b. If data meets conditions of the Contract:
    - 1) One copy will be returned to Contractor.
    - 2) One copy will be forwarded to Resident Project Representative.
    - 3) One copy will be retained in Engineer's file.
  - c. If data does not meet conditions of the Contract:
    - 1) All copies will be returned to Contractor with Engineer's comments (on separate document) for revision.
    - 2) Engineer's comments will be retained in Engineer's file.
    - 3) Resubmit two copies revised in accordance with Engineer's comments.
3. Final Data: Submit two copies in format specified herein.

1.06 DATA FOR EQUIPMENT AND SYSTEMS

A. Content for Each Unit (or Common Units) and System:

1. Product Data:
  - a. Include only those sheets that are pertinent to specific product.
  - b. Clearly annotate each sheet to:
    - 1) Identify specific product or part installed.
    - 2) Identify data applicable to installation.
    - 3) Delete references to inapplicable information.
  - c. Function, normal operating characteristics, and limiting conditions.
  - d. Performance curves, engineering data, nameplate data, and tests.

- e. Complete nomenclature and commercial number of replaceable parts.
  - f. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list, and diagrams required for maintenance.
  - g. Spare parts ordering instructions.
  - h. Where applicable, identify installed spares and other provisions for future work (e.g., reserved panel space, unused components, wiring, terminals).
2. As-installed, color-coded piping diagrams.
3. Charts of valve tag numbers, with the location and function of each valve.
4. Drawings: Supplement product data with Drawings as necessary to clearly illustrate:
  - a. Format:
    - 1) Provide reinforced, punched, binder tab; bind in with text.
    - 2) Reduced to 8-1/2 inches by 11 inches, or 11 inches by 17 inches folded to 8-1/2 inches by 11 inches.
    - 3) Where reduction is impractical, fold and place in 8-1/2-inch by 11-inch envelopes bound in text.
    - 4) Identify Specification section and product on Drawings and envelopes.
  - b. Relations of component parts of equipment and systems.
  - c. Control and flow diagrams.
  - d. Coordinate drawings with Project record documents to assure correct illustration of completed installation.
5. Instructions and Procedures: Within text, as required to supplement product data.
  - a. Format:
    - 1) Organize in consistent format under separate heading for each different procedure.
    - 2) Provide logical sequence of instructions for each procedure.
    - 3) Provide information sheet for Owner's personnel, including:
      - a) Proper procedures in event of failure.
      - b) Instances that might affect validity of guarantee or Bond.
  - b. Installation Instructions: Including alignment, adjusting, calibrating, and checking.
  - c. Operating Procedures:
    - 1) Startup, break-in, routine, and normal operating instructions.
    - 2) Test procedures and results of factory tests where required.
    - 3) Regulation, control, stopping, and emergency instructions.
    - 4) Description of operation sequence by control manufacturer.
    - 5) Shutdown instructions for both short and extended duration.
    - 6) Summer and winter operating instructions, as applicable.

- 7) Safety precautions.
      - 8) Special operating instructions.
    - d. Maintenance and Overhaul Procedures:
      - 1) Routine maintenance.
      - 2) Guide to troubleshooting.
      - 3) Disassembly, removal, repair, reinstallation, and re-assembly.
  - 6. Guarantee, Bond, and Service Agreement: In accordance with Section 01 77 00, Closeout Procedures.
- B. Content for Each Electric or Electronic Item or System:
- 1. Description of Unit and Component Parts:
    - a. Function, normal operating characteristics, and limiting conditions.
    - b. Performance curves, engineering data, nameplate data, and tests.
    - c. Complete nomenclature and commercial number of replaceable parts.
    - d. Interconnection wiring diagrams, including control and lighting systems.
  - 2. Circuit Directories of Panelboards:
  - 3. Electrical service.
  - 4. Control requirements and interfaces.
  - 5. Communication requirements and interfaces.
  - 6. List of electrical relay settings, and control and alarm contact settings.
  - 7. Electrical interconnection wiring diagram, including as applicable, single-line, three-line, schematic and internal wiring, and external interconnection wiring.
  - 8. As-installed control diagrams by control manufacturer.
  - 9. Operating Procedures:
    - a. Routine and normal operating instructions.
    - b. Startup and shutdown sequences, normal and emergency.
    - c. Safety precautions.
    - d. Special operating instructions.
  - 10. Maintenance Procedures:
    - a. Routine maintenance.
    - b. Guide to troubleshooting.
    - c. Adjustment and checking.
    - d. List of relay settings, control and alarm contact settings.
  - 11. Manufacturer's printed operating and maintenance instructions.
  - 12. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

C. Maintenance Summary:

1. Compile individual Maintenance Summary for each applicable equipment item, respective unit or system, and for components or sub-units.
2. Format:
  - a. Use Maintenance Summary Form bound with this section or electronic facsimile of such.
  - b. Each Maintenance Summary may take as many pages as required.
  - c. Use only 8-1/2-inch by 11-inch size paper.
  - d. Complete using typewriter or electronic printing.
3. Include detailed lubrication instructions and diagrams showing points to be greased or oiled; recommend type, grade, and temperature range of lubricants and frequency of lubrication.
4. Recommended Spare Parts:
  - a. Data to be consistent with manufacturer's Bill of Materials/Parts List furnished in O&M manuals.
  - b. "Unit" is the unit of measure for ordering the part.
  - c. "Quantity" is the number of units recommended.
  - d. "Unit Cost" is the current purchase price.

1.07 DATA FOR MATERIALS AND FINISHES

A. Content for Architectural Products, Applied Materials, and Finishes:

1. Manufacturer's data, giving full information on products:
  - a. Catalog number, size, and composition.
  - b. Color and texture designations.
  - c. Information required for reordering special-manufactured products.
2. Instructions for Care and Maintenance:
  - a. Manufacturer's recommendation for types of cleaning agents and methods.
  - b. Cautions against cleaning agents and methods that are detrimental to product.
  - c. Recommended schedule for cleaning and maintenance.

B. Content for Moisture Protection and Weather Exposed Products:

1. Manufacturer's data, giving full information on products:
  - a. Applicable standards.
  - b. Chemical composition.
  - c. Details of installation.
2. Instructions for inspection, maintenance, and repair.

1.08 SUPPLEMENTS

A. The supplement listed below, following “End of Section”, is part of this Specification.

1. Form: Maintenance Summary Form.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



MAINTENANCE SUMMARY FORM

PROJECT: \_\_\_\_\_ CONTRACT NO.: \_\_\_\_\_

1. EQUIPMENT ITEM \_\_\_\_\_

2. MANUFACTURER \_\_\_\_\_

3. EQUIPMENT/TAG NUMBER(S) \_\_\_\_\_

4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) \_\_\_\_\_

5. NAMEPLATE DATA (hp, voltage, speed, etc.) \_\_\_\_\_

6. MANUFACTURER'S LOCAL REPRESENTATIVE \_\_\_\_\_

a. Name \_\_\_\_\_ Telephone No. \_\_\_\_\_

b. Address \_\_\_\_\_

## 7. MAINTENANCE REQUIREMENTS

Maintenance Operation Comments	Frequency	Lubricant (If Applicable)
List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable.)	List required frequency of each maintenance operation.	Refer by symbol to lubricant required.

## 8. LUBRICANT LIST

<b>Reference Symbol</b>	<b>Shell</b>	<b>Exxon Mobile</b>	<b>Chevron Texaco</b>	<b>BP Amoco</b>	<b>Or Equal</b>
List symbols used in No. 7 above.	List equivalent lubricants, as distributed by each manufacturer for the specific use recommended.				

## 9. RECOMMENDED SPARE PARTS FOR OWNER'S INVENTORY.

<b>Part No.</b>	<b>Description</b>	<b>Unit</b>	<b>Quantity</b>	<b>Unit Cost</b>
Note: Identify parts provided by this Contract with two asterisks.				



## **SECTION 01 88 15 ANCHORAGE AND BRACING**

### **PART 1 GENERAL**

#### **1.01 SUMMARY**

- A. This section covers requirements for anchorage and bracing of equipment, distribution systems, and other nonstructural components required in accordance with the ICC 2012, 2015, and 2018 International Building Code (IBC), for seismic, wind, gravity, soil, and operational loads.

#### **1.02 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
  - 1. American Institute of Steel Construction (AISC) 360, Specification for Structural Steel Buildings.
  - 2. American Society of Civil Engineers (ASCE):
    - a. ASCE 7-10, Minimum Design Loads for Buildings and Other Structures.
    - b. ASCE 7-16, Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
  - 3. International Code Council (ICC): International Building Code (IBC).
  - 4. National Fire Protection Association (NFPA): 13, Standard for the Installation of Sprinkler Systems.
  - 5. State of Alabama.

#### **1.03 DEFINITIONS**

- A. Authority Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
- B. Designated Seismic System: Architectural, electrical, and mechanical system or their components for which component importance factor is greater than 1.0.

## 1.04 DESIGN AND PERFORMANCE REQUIREMENTS

### A. General:

1. Anchorage and bracing systems shall be designed by a qualified professional engineer registered in the State of Alabama.
2. Design anchorage into concrete including embedment in accordance with ACI 318-14; Chapter 17 (or other industry standard approved by Engineer), and Project Specifications.
  - a. Unless otherwise noted, design for cracked concrete condition.
3. Design anchorage and bracing of architectural, mechanical, and electrical components and systems in accordance with this section, unless a design is specifically provided within Contract Documents or where exempted hereinafter.
4. Design attachments, braces, and anchors for equipment, components, and distribution systems to structure for gravity, seismic, wind, and operational loading.
5. Design seismic anchorage and bracing for modified existing architectural, mechanical, or electrical systems where code requirements would dictate design for similar new components.
6. Anchor and brace piping and ductwork, whether exempt or not exempt for this section, so that lateral or vertical displacement does not result in damage or failure to essential architectural, mechanical, or electrical equipment.
7. Architectural Components: Includes, but are not limited to, nonstructural walls and elements, partitions, cladding and veneer, access flooring, signs, cabinets, suspended ceilings, and glass in glazed curtain walls and partitions.
8. Provide supplementary framing where required to transfer anchorage and bracing loads to structure.
9. Adjust equipment pad sizes or provide additional anchorage confinement reinforcing to provide required anchorage capacities.
10. Anchor existing equipment as noted on Drawings.
11. Design anchorage and bracing for:
  - a. Equipment and components that weigh more than 800 pounds and are mounted 5 feet or less above adjacent finished floor.
  - b. Unless otherwise specified, equipment weighing more than 40 pounds that is mounted more than 5 feet above adjacent finished floor.
    - 1) Facility (20) Chlorine and SO<sub>2</sub> Building: Regardless of height, components and equipment with Ip greater than 1.0 and weighing more than 20 pounds.

- c. Mechanical and electrical components that are not provided with flexible connections between components and associated ductwork, piping, or conduit.
- d. Unless otherwise specified, distribution systems that weigh more than 5 pounds per foot that are mounted more than 5 feet above adjacent finished floor.
  - 1) Facility (20) Chlorine and SO<sub>2</sub> Building: Regardless of height, components and equipment with Ip greater than 1.0 and weighing more than 5 pounds per foot.
- 12. Facility (20) Chlorine and SO<sub>2</sub> Building: Design seismic anchorage and bracing for Designated Seismic Systems regardless of weight or mounting height.
  - a. Refer to Section 01 45 36, Equipment Seismic Certification, for list of designated components.
- 13. For components exempted from design requirements of this section, provide bolted, welded, or otherwise positively fastened attachments to supporting structure.

B. Design Loads:

- 1. Gravity: Design anchorage and bracing for self-weight and superimposed loads on components and equipment.
- 2. Wind: Design anchorage and bracing for wind criteria provided on General Structural Notes on Drawings for exposed architectural components and exterior and wind-exposed mechanical and electrical equipment. Alternately, manufacturer certification may be provided for components such as roofing and flashing to verify attachments meet Project-specific design criteria.
- 3. Operational:
  - a. For loading supplied by equipment manufacturer for IBC required load cases.
  - b. Loads may include equipment vibration, torque, thermal effects, effects of internal contents (weight and sloshing), water hammer, and other load-inducing conditions.
  - c. Locate braces to minimize vibration to or movement of structure.
  - d. For vibrating loads, use anchors meeting requirements of Section 05 50 00, Metal Fabrications or Section 05 05 19, Post-Installed Anchors, for anchors with designated capacities for vibratory loading per manufacturer's ICC-ES report.
- 4. Hydraulic: Design of anchorage for submerged gates and other mechanical equipment shall include hydrostatic and hydrodynamic loads determined in accordance with Section 15.7 of ASCE 7.

5. Seismic:
  - a. In accordance with Section 1613 of IBC, and Chapter 13 of ASCE 7.
  - b. Design anchorage and bracing for design criteria listed on General Structural Notes on Drawings.
  - c. Design forces for anchors in concrete or masonry shall be in accordance with ASCE 7, Section 13.4.2, or IBC Section 1905.1.9 as applicable for Project Seismic Design Category.

C. Seismic Design Requirements:

1. Nonstructural Components: Design as nonbuilding structures for components with weights greater than or equal to 25 percent of effective seismic weight of overall structure.
2. Analyze local region of body of nonstructural component for load transfer of anchorage attachment if component  $I_p = 1.5$ .
3. The following are exempt from requirements for provision of seismic anchorages and bracing, in addition to those items specifically exempted in ASCE 7, Part 13.5 for architectural components and Part 13.6 for electrical and mechanical equipment:
  - a. Furniture, except storage cabinets and bookshelves over 6 feet tall.
  - b. Temporary or movable equipment.
4. Fire protection sprinkler systems designed and constructed in accordance with NFPA 13 shall be considered to meet requirements of Chapter 13 of ASCE 7.
5. E: Provide support drawings and calculations for electrical distribution components if any of the following conditions apply:
  - a. Conduit diameter is greater than 2.5-inch trade size.
  - b. Total weight of bus duct, cable tray, or conduit supported by trapeze assemblies exceeds 10 pounds per foot.
6. Existing components, systems, and equipment in their final condition that are modified by Project requirements and are not exempted by above paragraph require the same anchorage and bracing drawing and calculation submittals as new equipment. Field verify existing conditions.
7. Other seismic design and detailing information identified in ASCE 7, Chapter 13, is required to be provided for new and modified or noted architectural, mechanical and electrical components, systems, or equipment.

## 1.05 SUBMITTALS

### A. Action Submittals:

1. Shop Drawings:
  - a. List of architectural, mechanical, and electrical equipment requiring Contractor-designed anchorage and bracing, unless specifically exempted.
  - b. Manufacturers' engineered seismic and non-seismic hardware product data.
  - c. Attachment assemblies' drawings including seismic attachments; include connection hardware, braces, and anchors or anchor bolts for nonexempt components, equipment, and systems.
  - d. List of existing architectural, mechanical, and electrical equipment or components to be modified in Project requiring Contractor-designed anchorage and bracing in final retrofitted condition.
  - e. Drawings for seismic attachment assemblies include connection hardware, braces, and anchors (or anchor bolts) for modified, nonexempt existing components, equipment, and systems where a combination of new and existing systems or components' final condition would require anchorage or bracing under this specification for new equipment.
  - f. Submittal will be rejected if proposed anchorage method would create excessive stress to supporting member. Revise anchorages and strengthen structural support to eliminate overstressed condition.

### B. Informational Submittals:

1. Anchorage and Bracing Calculations: For attachments, braces, and anchorages, include IBC and Project-specific criteria as noted on General Structural Notes on Drawings, in addition to manufacturer's specific criteria used for design; sealed by a civil or structural engineer registered in the State of Alabama.
2. Manufacturer's hardware installation requirements.

### C. Deferred Submittals:

1. Submitted seismic anchorage drawings and calculations identified as deferred submittals, will be submitted to and must be accepted by AHJ prior to installation of component, equipment, or distribution system.
2. Submit deferred Action Submittals such as Shop Drawings with supporting deferred informational submittals such as calculations no less than 4 weeks in advance of installation of component, equipment or distribution system to be anchored to structure.

**1.06 SOURCE QUALITY CONTROL**

- A. Contractor and supplier responsibilities to accommodate Owner-furnished shop fabrication related special inspections and testing are provided in Project's Statement of Special Inspections on Drawings, and Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Provide all other specified, regulatory required, or required repair verification inspection and testing that is not listed in Statement of Special Inspections in accordance with Section 01 45 16.13, Contractor Quality Control.
- C. Provide Source Quality Control for welding and hot-dip galvanizing of anchors in accordance with Section 05 50 00, Metal Fabrications.

**PART 2 PRODUCTS**

**2.01 GENERAL**

- A. Design and construct attachments and supports transferring seismic and non-seismic loads to structure of materials and products suitable for application and in accordance with design criteria shown on Drawings and nationally recognized standards.
- B. Provide anchor bolts for anchorage of equipment to concrete or masonry in accordance with Section 05 50 00, Metal Fabrications. Provide anchor bolts of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- C. Provide post-installed concrete and masonry anchors for anchorage of equipment to concrete or masonry in accordance with Section 05 05 19, Post-Installed Anchors. Provide post-installed anchors of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- D. Do not use powder-actuated fasteners or sleeve anchors for seismic attachments and anchorage where resistance to tension loads is required. Do not use expansion anchors, other than undercut anchors, for nonvibration isolated mechanical equipment rated over 10 horsepower.

## **PART 3      EXECUTION**

### **3.01      GENERAL**

- A. Make attachments, bracing, and anchorage in such a manner that component lateral force is transferred to lateral force resisting system of structure through a complete load path.
- B. Design, provide, and install overall seismic anchorage system to provide restraint in all directions, including vertical, for each component or system so anchored.
- C. Provide snubbers in each horizontal direction and vertical restraints for components mounted on vibration isolation systems where required to resist overturning.
- D. Provide piping anchorage that maintains design flexibility and expansion capabilities at flexible connections and expansion joints.
  - 1. Piping and ductwork suspended more than 12 inches below supporting structure shall be braced for seismic effects to avoid significant bending of hangers and their attachments, unless high- or limited-deformability piping is used per ASCE 7, Section 13.6.8 or HVAC ducts have a cross-sectional area of less than 6 square feet or weigh 17 pounds per foot or less.
- E. Anchor tall and narrow equipment such as motor control centers and telemetry equipment at base and within 12 inches from top of equipment, unless approved otherwise by Engineer.
- F. Do not attach architectural, mechanical, or electrical components to more than one element of a building structure at a single restraint location where such elements may respond differently during a seismic event. Do not make such attachments across building expansion and contraction joints.

### **3.02      INSTALLATION**

- A. Do not install components or their anchorages or restraints prior to review and acceptance by Engineer and AHJ.
- B. Notify Engineer upon completion of installation of seismic restraints in accordance with Section 01 45 33, Special Inspection, Observation, and Testing.

3.03 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. In accordance with Section 05 50 00, Metal Fabrications and Section 05 05 19, Post-Installed Anchors.
- B. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- C. Provide any other specified, regulatory required, or required repair verification inspection and testing that is not listed in Statement of Special Inspections in accordance with Section 01 45 16.13, Contractor Quality Control.

**END OF SECTION**



**SECTION 01 91 14**  
**EQUIPMENT TESTING AND FACILITY STARTUP**

**PART 1      GENERAL**

**1.01      DEFINITIONS**

- A.    Facility: Entire Project, or an agreed-upon portion, including all of its unit processes.
- B.    Functional Test: Test or tests in presence of Engineer and Owner to demonstrate that installed equipment meets manufacturer's installation, calibration, and adjustment requirements and other requirements as specified.
- C.    Performance Test: Test or tests performed after any required functional test in presence of Engineer and Owner to demonstrate and confirm individual equipment meets performance requirements specified in individual sections.
- D.    Unit Process: As used in this section, a unit process is a portion of the facility that performs a specific process function, such as a pumping station.
- E.    Facility Performance Demonstration:
  - 1.    A demonstration, conducted by Contractor, with assistance of Owner, to demonstrate and document the performance of the entire operating facility, both manually and automatically (if required), based on criteria developed in conjunction with Owner and as accepted by Engineer.
  - 2.    Such demonstration is for the purposes of (i) verifying to Owner entire facility performs as a whole, and (ii) documenting performance characteristics of completed facility for Owner's records. Neither the demonstration nor the evaluation is intended in any way to make performance of a unit process or entire facility the responsibility of Contractor, unless such performance is otherwise specified.

**1.02      SUBMITTALS**

- A.    Informational Submittals:
  - 1.    Facility Startup and Performance Demonstration Plan.
  - 2.    Functional and performance test results.
  - 3.    Completed Unit Process Startup Form for each unit process.
  - 4.    Completed Facility Performance Demonstration/Certification Form.

### 1.03 FACILITY STARTUP AND PERFORMANCE DEMONSTRATION PLAN

- A. Develop a written plan, in conjunction with Owner's operations personnel; to include the following:
1. Step-by-step instructions for startup of each unit process and the complete facility.
  2. Unit Process Startup Form (sample attached), to minimally include the following:
    - a. Description of the unit process, including equipment numbers/nomenclature of each item of equipment and all included devices.
    - b. Detailed procedure for startup of the unit process, including valves to be opened/closed, order of equipment startup, etc.
    - c. Startup requirements for each unit process, including water, power, chemicals, etc.
    - d. Space for evaluation comments.
  3. Facility Performance Demonstration/Certification Form (sample attached), to minimally include the following:
    - a. Description of unit processes included in the facility startup.
    - b. Sequence of unit process startup to achieve facility startup.
    - c. Description of computerized operations, if any, included in the facility.
    - d. Contractor certification facility is capable of performing its intended function(s), including fully automatic operation.
    - e. Signature spaces for Contractor and Engineer.

### **PART 2 PRODUCTS (NOT USED)**

### **PART 3 EXECUTION**

#### 3.01 GENERAL

- A. Facility Startup Meetings: Schedule, in accordance with requirements of Section 01 31 19, Project Meetings, to discuss test schedule, test methods, materials, chemicals and liquids required, facilities operations interface, and Owner involvement.
- B. Contractor's Testing and Startup Representative:
1. Designate and furnish one or more personnel to coordinate and expedite testing and facility startup.
  2. Representative(s) shall be present during startup meetings and shall be available at all times during testing and startup.

- C. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required for testing and startup.
- D. Provide Subcontractor and equipment manufacturers' staff adequate to prevent delays. Schedule ongoing work so as not to interfere with or delay testing and startup.
- E. Owner will:
  - 1. Provide water, power, chemicals, and other items as required for startup, unless otherwise indicated.
  - 2. Operate process units and facility with support of Contractor.

### 3.02 EQUIPMENT TESTING

- A. Preparation:
  - 1. Complete installation before testing.
  - 2. Furnish qualified manufacturers' representatives, when required by individual Specification sections.
  - 3. Obtain and submit from equipment manufacturer's representative Manufacturer's Certificate of Proper Installation Form, in accordance with Section 01 43 33, Manufacturers' Field Services, when required by individual Specification sections.
  - 4. Equipment Test Report Form: Provide written test report for each item of equipment to be tested, to include the minimum information:
    - a. Owner/Project Name.
    - b. Equipment or item tested.
    - c. Date and time of test.
    - d. Type of test performed (Functional or Performance).
    - e. Test method.
    - f. Test conditions.
    - g. Test results.
    - h. Signature spaces for Contractor and Engineer as witness.
  - 5. Cleaning and Checking: Prior to beginning functional testing:
    - a. Calibrate testing equipment in accordance with manufacturer's instructions.
    - b. Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material.
    - c. Lubricate equipment in accordance with manufacturer's instructions.
    - d. Turn rotating equipment by hand when possible to confirm that equipment is not bound.
    - e. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.

- f. Check power supply to electric-powered equipment for correct voltage.
  - g. Adjust clearances and torque.
  - h. Test piping for leaks.
- 6. Ready-to-test determination will be by Engineer based at least on the following:
  - a. Acceptable Operation and Maintenance Data.
  - b. Notification by Contractor of equipment readiness for testing.
  - c. Receipt of Manufacturer's Certificate of Proper Installation, if so specified.
  - d. Adequate completion of work adjacent to, or interfacing with, equipment to be tested.
  - e. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
  - f. Satisfactory fulfillment of other specified manufacturer's responsibilities.
  - g. Equipment and electrical tagging complete.
  - h. Delivery of all spare parts and special tools.

B. Functional Testing:

- 1. Conduct as specified in individual Specification sections.
- 2. Notify Owner and Engineer in writing at least 10 days prior to scheduled date of testing.
- 3. Prepare Equipment Test Report summarizing test method and results.
- 4. When, in Engineer's opinion, equipment meets functional requirements specified, such equipment will be accepted for purposes of advancing to performance testing phase, if so required by individual Specification sections. Such acceptance will be evidenced by Engineer/Owner's signature as witness on Equipment Test Report.

C. Performance Testing:

- 1. Conduct as specified in individual Specification sections.
- 2. Notify Engineer and Owner in writing at least 10 days prior to scheduled date of test.
- 3. Performance testing shall not commence until equipment has been accepted by Engineer as having satisfied functional test requirements specified.
- 4. Type of fluid, gas, or solid for testing shall be as specified.
- 5. Unless otherwise indicated, furnish labor, materials, and supplies for conducting the test and taking samples and performance measurements.

6. Prepare Equipment Test Report summarizing test method and results.
7. When, in Engineer's opinion, equipment meets performance requirements specified, such equipment will be accepted as conforming to Contract requirements. Such acceptance will be evidenced by Engineer's signature on Equipment Test Report.

### 3.03 STARTUP OF UNIT PROCESSES

- A. Prior to unit process startup, equipment within unit process shall be accepted by Engineer as having met functional and performance testing requirements specified.
- B. Make adjustments, repairs, and corrections necessary to complete unit process startup.
- C. Startup shall be considered complete when, in opinion of Engineer, unit process has operated in manner intended for 5 continuous days without significant interruption. This period is in addition to functional or performance test periods specified elsewhere.
- D. Significant Interruption: May include any of the following events:
  1. Failure of Contractor to provide and maintain qualified onsite startup personnel as scheduled.
  2. Failure to meet specified functional operation.
  3. Failure of any critical equipment or unit process that is not satisfactorily corrected within 5 hours after failure.
  4. Failure of any noncritical equipment or unit process that is not satisfactorily corrected within 8 hours after failure.
  5. As determined by Engineer.
- E. A significant interruption will require startup then in progress to be stopped. After corrections are made, startup test period to start from beginning again.

### 3.04 FACILITY PERFORMANCE DEMONSTRATION

- A. When, in the opinion of Engineer, startup of all unit processes has been achieved, sequence each unit process to the point that facility is operational.
- B. Demonstrate proper operation of required interfaces within and between individual unit processes.
- C. After facility is operating, complete performance testing of equipment and systems not previously tested.

- D. Document, as defined in Facility Startup and Performance Demonstration Plan, the performance of the facility including its computer system, until all unit processes are operable and under control of computer system.
- E. Certify, on the Facility Performance Demonstration/Certification Form, that facility is capable of performing its intended function(s), including fully automatic and computerized operation.

3.05 SUPPLEMENTS

- A. Supplements listed below, following “End of Section,” are a part of this Specification:
  - 1. Unit Process Startup Form.
  - 2. Facility Performance Demonstration/Certification Form.

**END OF SECTION**

## UNIT PROCESS STARTUP FORM

OWNER: \_\_\_\_\_ PROJECT: \_\_\_\_\_

Unit Process Description: (Include description and equipment number of all equipment and devices):

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Startup Procedure (Describe procedure for sequential startup and evaluation, including valves to be opened/closed, order of equipment startup, etc.):

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Startup Requirements (Water, power, chemicals, etc.): \_\_\_\_\_

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Evaluation Comments: \_\_\_\_\_

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**FACILITY PERFORMANCE DEMONSTRATION/CERTIFICATION FORM**

**OWNER:** \_\_\_\_\_ **PROJECT:** \_\_\_\_\_

**Unit Processes Description (List unit processes involved in facility startup):**

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**Unit Processes Startup Sequence (Describe sequence for startup, including computerized operations, if any):**

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**Contractor Certification that Facility is capable of performing its intended function(s), including fully automatic operation:**

**Contractor:** \_\_\_\_\_ **Date:** \_\_\_\_\_, 20\_\_\_\_

**Engineer:** \_\_\_\_\_ **Date:** \_\_\_\_\_, 20\_\_\_\_  
(Authorized Signature)



**SECTION 02 41 00  
DEMOLITION**

**PART 1 GENERAL**

**1.01 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
1. Air-Conditioning, Heating, and Refrigeration Institute (AHRI): Guideline K, Containers for Recovered Non-flammable Fluorocarbon Refrigerants.
  2. American National Standards Institute (ANSI): A10.6, Safety Requirements for Demolition Operations.
  3. Occupational Safety and Health Administration (OSHA), U.S. Code of Federal Regulations (CFR) Title 29 Part 1926—Occupational Safety and Health Regulations for Construction.
  4. Environmental Protection Agency (EPA), U.S. Code of Federal Regulations (CFR), Title 40:
    - a. Part 61—National Emission Standards for Hazardous Air Pollutants.
    - b. Part 82—Protection of Stratospheric Ozone.
    - c. Part 273—Standards for Universal Waste Management.

**1.02 DEFINITIONS**

- A. Demolition: Dismantling, razing, destroying, or wrecking of any fixed building or structure or any part thereof. Demolition also includes removal of pipes, manholes tanks, conduit, and other underground facilities, whether as a separate activity or in conjunction with construction of new facilities.
- B. Modify: Provide all necessary material and labor to modify an existing item to the condition indicated or specified.
- C. Relocate: Remove, protect, clean and reinstall equipment, including electrical, instrumentation, and all ancillary components required to make the equipment fully functional, to the new location identified on the Drawings.
- D. Renovation: Altering a facility or one or more facility components in any way.
- E. Salvage/Salvageable: Remove and deliver, to the specified location(s), the equipment, building materials, or other items so identified to be saved from destruction, damage, or waste; such property to remain that of Owner. Unless otherwise specified, title to items identified for demolition shall revert to Contractor.

- F. Universal Waste Lamp: In accordance with 40 CFR 273, the bulb or tube portion of an electric lighting device, examples of which include, but are not limited to, fluorescent, high-intensity discharge, neon, mercury vapor, high-pressure sodium, and metal halide lamps.
- G. Universal Waste Thermostat: A temperature control device that contains metallic mercury in an ampule attached to a bimetal sensing element, and mercury-containing ampules that have been removed from these temperature control devices in compliance with the requirements of 40 CFR 273.

#### 1.03 SUBMITTALS

- A. Informational Submittals:
  - 1. Submit proposed Demolition/Renovation Plan, in accordance with requirements specified herein, for approval before such Work is started.
  - 2. Submit copies of any notifications, authorizations and permits required to perform the Work.
  - 3. Submit a shipping receipt or bill of lading for all containers of ozone depleting substance (ODS) shipped.
  - 4. Submit a shipping receipt or bill of lading for all universal waste shipped.

#### 1.04 REGULATORY AND SAFETY REQUIREMENTS

- A. When applicable, demolition Work shall be accomplished in strict accordance with 29 CFR 1926-Subpart T.
- B. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the General Conditions, Contractor's safety requirements shall conform to ANSI A10.6.
- C. Furnish timely notification of this demolition project to applicable federal, state, regional, and local authorities in accordance with 40 CFR 61-Subpart M.

#### 1.05 DEMOLITION/RENOVATION PLAN

- A. Demolition/Renovation Plan shall provide for safe conduct of the Work and shall include:
  - 1. Detailed description of methods and equipment to be used for each operation;
  - 2. The Contractor's planned sequence of operations, including coordination with other work in progress;

1.06 SEQUENCING AND SCHEDULING

- A. The Work of this Specification shall not commence until Contractor's Demolition/Renovation Plan has been approved by Engineer.
- B. Include the Work of this Specification in the progress schedule, as specified in Section 01 32 00, Construction Progress Documentation.

1.07 USE OF EXPLOSIVES

- A. Not allowed.

1.08 ENVIRONMENTAL PROTECTION

- A. Sequence and coordinate all demolition to be in concert with the proposed construction soot maintain in service the existing facility and its ability to continuously accept incoming raw sewage.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

3.01 EXISTING FACILITIES TO BE DEMOLISHED OR RENOVATED

- A. Facilities:
  - 1. Buildings and adjacent designated areas scheduled for complete demolition are as shown.
  - 2. Portions of buildings and other areas scheduled for selective demolition, partial demolition, and renovation Work are as shown.
- B. Structures:
  - 1. Existing above-grade structures indicated shall be removed in their entirety down to and inclusive of pile caps as may be present but exclusive of pile foundations.
  - 2. Sidewalks, curbs, gutters and street light bases shall be removed as indicated.
- C. Substructure:
  - 1. Extract conflicting existing pilings within the footprint of new facilities and structures.
  - 2. Remove in their entirety down to and inclusive of pile caps and pile foundations.

D. Utilities and Related Equipment:

1. Coordinate with Owner and Engineer or appropriate utilities to turn off affected services at least 48 hours before starting demolition activities.
2. Remove existing utilities and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by Engineer.
3. When utility lines are encountered that are not indicated on the Drawings, notify Owner and Engineer prior to further work in that area.
4. Remove meters and related equipment and deliver to a location as determined by the Owner.
5. Excavate and remove utility lines serving buildings to be demolished to a distance of at least five feet beyond the outside perimeter of the demolition or as indicated in the drawings.
6. Provide a permanent leak-proof closure for water and gas lines.
7. Plug sewer lines with concrete to a minimum plug length often feet to prevent groundwater infiltration.

E. Paving and Slabs:

1. Remove concrete and asphaltic concrete paving and slabs as required for the prosecution of the work where it is to be replaced. Remove to its full depth where not scheduled to be replaced.
2. Provide neat sawcuts at limits of pavement removal as indicated.

F. Concrete:

1. Core drill corners of new opening to avoid overcutting adjacent reinforcing in existing concrete to remain. Saw concrete along straight lines to a depth of not less than 2 inches. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished Work, and the remaining concrete is sound.
2. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete. Repair exposed rebar ends and embeds as shown on Drawings.
3. Where new concrete adjoins existing concrete, thoroughly clean and mechanically roughen existing concrete surfaces to roughness profile of 3/16 inch. Rebar and small embeds at existing concrete may be required to be left to engage new concrete. Saturate surface with water for 24 hours prior to placing new concrete. The new Work shall tie into the existing construction as shown on Drawings.

G. Patching:

1. Where removals leave holes and damaged surfaces exposed in the finished Work, patch and repair to match adjacent finished surfaces as to texture and finish.
2. Where new Work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new Work.
3. Patching shall be as specified and indicated, and shall include: Fill holes and depressions left as a result of removals in existing walls with an approved patching material, applied in accordance with the manufacturer's printed instructions.

H. Air-Conditioning Equipment:

1. Remove air-conditioning equipment without releasing chlorofluorocarbon refrigerants to the atmosphere in accordance with the Clean Air Act Amendment of 1990.
2. Recover all refrigerants prior to removing air-conditioning equipment and dispose of as specified in Paragraph Ozone Depleting Substances (ODS).

I. Cylinders and Canisters: Remove all fire suppression system cylinders and canisters and dispose as specified in Paragraph Ozone Depleting Substances (ODS).

J. Door Locksets: Remove all locksets from all doors indicated to be removed and disposed of. Turn locksets over to Owner immediately after their removal.

K. Electrical:

1. Cut off concealed or embedded conduit, boxes, or other materials a minimum of 3/4 inch below final finished surface.
2. When removing designated equipment, conduit and wiring may require rework to maintain service to other equipment.
3. Rework existing circuits, or provide temporary circuits as necessary during renovation to maintain service to existing lighting and equipment not scheduled to be renovated. Existing equipment and circuiting shown are based upon limited field surveys. Verify existing conditions, make all necessary adjustments, and record the Work on the Record Drawings. This shall include, but is not limited to, swapping and other adjustments to branch circuits and relocation of branch circuit breakers within panelboards as required to accomplish the finished work.
4. Reuse of existing luminaires, devices, conduits, boxes, or equipment will be permitted only where specifically indicated.

5. Raceways and cabling not scheduled for reuse.
6. Inaccessibly Concealed: Cut off and abandon in place.
7. Exposed or Concealed Above Accessible Ceilings: Remove.
8. Raceways and Cabling Scheduled for Future Use: Cap/seal and tag.
9. Relocating Equipment: Extend existing wiring or run new wiring from the source.
10. Where the existing raceway is concealed, the outlet box shall be cleaned, and a blank cover plate installed.
11. Where the concealed raceway is uncovered remove raceway (or extended to new location if appropriate).
12. Provide new typewritten panelboard circuit directory cards.

L. Security:

1. Ensure existing gate cameras and gate controls remain functional at all times with control maintained at the administration building and at the temporary operations room, prior and during the security replacements, and until they are replaced by the permanent operational replacements.
2. Test door operation of any secured doors after demolition to ensure they function as intended.
3. Test backup power transfer to gate cameras, gate controls, and secured doors to ensure this function as intended.
4. Coordinate with the electrical and the control teams to ensure the necessary power feeds and fiber connections are provided as intended for the temporary operation room, prior and during the security replacements, and until they are replaced by the permanent operational replacement.
5. Coordinate with the owner to determine the best location for the security equipment in the temporary operation control room and in the permanent operational replacement.

M. Universal Waste Lamps and Thermostats: Manage, contain, package, and label in strict accordance with 40 CFR 273.

3.02 PROTECTION

A. Dust and debris Control:

1. Prevent the spread of dust and debris to occupied portions of the Site and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.
2. Sweep pavements as often as necessary to control the spread of debris that may result in foreign object damage potential to vehicular traffic.



B. Existing Work:

1. Survey the site and examine the Drawings and Specifications to determine the extent of the Work before beginning any demolition or renovation.
2. Take necessary precautions to avoid damage to existing items scheduled to remain in place, to be reused, or to remain the property of Owner; any Contractor-damaged items shall be repaired or replaced as directed by Engineer.
3. Provide temporary weather protection during interval between removal of existing exterior surfaces and installation of new to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
4. Ensure that structural elements are not overloaded as a result of or during performance of the Work. Responsibility for additional structural elements or increasing the strength of existing structural elements as may be required as a result of any Work performed under this Contract shall be that of the Contractor. Repairs, reinforcement, or structural replacement must have Engineer approval.
5. Do not overload pavements to remain.

C. Weather Protection: For portions of the building scheduled to remain, protect building interior and materials and equipment from weather at all times. Where removal of existing roofing is necessary to accomplish the Work, have materials and workmen ready to provide adequate and temporary covering of exposed areas so as to ensure effectiveness and to prevent loss.

D. Trees: Protect trees within the Site that might be damaged during demolition and are indicated to be left in place, by a 6-foot-high fence. The fence shall be securely erected a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Any tree designated to remain that is damaged during the Work shall be replaced in kind, as approved by the Engineer.

E. Facilities:

1. Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.
2. Floors, roofs, walls, columns, pilasters, and other structural elements that are designed and constructed to stand without lateral support or shoring, and are determined by Contractor to be in stable condition, shall remain standing without additional bracing, shoring, or lateral support until demolished, unless directed otherwise by the Engineer.

3. Protect all facility elements not scheduled for demolition.
4. Provide interior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities.

F. Protection of Personnel:

1. During demolition, continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site.
2. Provide temporary barricades and other forms of protection to protect Owner's personnel and the general public from injury due to demolition Work.
3. Provide protective measures as required to provide free and safe passage of Owner's personnel and the general public to occupied portions of the structure.

3.03 BURNING

- A. The use of burning at the Site for the disposal of refuse and debris will not be permitted.

3.04 RELOCATIONS

- A. Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Clean all items to be relocated prior to reinstallation, to the satisfaction of Engineer. Repair items to be relocated which are damaged or replace damaged items with new undamaged items as approved by Engineer.

3.05 BACKFILL

- A. Do not use demolition debris as backfill material.
- B. Fill excavations, open basements and other hazardous openings to existing ground level or foundation level of new construction in accordance with Section 31 23 23, Fill and Backfill.

3.06 TITLE TO MATERIALS

- A. With the exception of the following listed salvaged equipment and materials, all items designated to be removed shall become the property of Contractor:
  1. Operations Building:
    - a. All furnishings.
    - b. Dedication Plaques.

- c. Components within control panel DCU-1 (aka RTU-1).
    - d. Computer equipment (including appurtenances and UPS units).
    - e. Communication Equipment.
    - f. Security Rack and equipment within it.
  2. Chlorine and SO2 Building:
    - a. Existing operational Chlorinators.
    - b. Existing operational Sulfonators.
    - c. Scales.
    - d. Hoists.
    - e. Chlorine Analyzers.
  3. All Process Equipment.
  4. Decommissioned Primary Clarifiers:
    - a. Sludge Flowmeter transmitter.
  5. Existing Electrical/Generator Building:
    - a. Components within control panel DCU-2 (aka RTU-2).
    - b. Components within control panel PLC-5 (aka Sidestream PLC, aka SWAT PLC).
  6. Existing Secondary Digester Building: Components within control panel DCU-3 (aka RTU-3).
  7. Existing Headworks Electrical Building: Components within control panel DCU-4 (aka RTU-4).
- B. Title to equipment and materials resulting from demolition is vested in the Contractor upon approval by Engineer of Contractor's Demolition/Renovation Plan, and the resulting authorization by Engineer to begin demolition.

### 3.07 DISPOSITION OF MATERIAL

- A. Do not remove equipment and materials without approval of Contractor's Demolition/Renovation Plan by Engineer.
- B. Salvage equipment and material to the maximum extent possible.
- C. Remove materials and equipment that are indicated and specified to be removed by Contractor and deliver to a storage site as directed on the Site.
- D. Remove salvaged items in a manner to prevent damage.
- E. Repair or replace, at the discretion of Engineer, items damaged during removal.

- F. Owner will not be responsible for the condition or loss of, or damage to, property scheduled to become Contractor's property after Engineer's authorization to begin demolition. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.
- G. Store salvaged items as approved by Engineer and remove them from Owner's property before completion of the Contract. Materials and equipment shall not be either viewed by prospective purchasers or sold on the Site.

### 3.08 REUSE OF MATERIALS AND EQUIPMENT

- A. Remove and store materials and equipment listed to be reused or relocated to prevent damage, and reinstall as the Work progresses.
- B. Properly store and maintain equipment and materials in same condition as when removed.
- C. Store equipment and material designated to be reused in a location designated by Owner.
- D. Equipment and material designated to be reused shall be cleaned, serviced and checked for proper operability before being put back into service.
- E. Engineer will determine condition of equipment and materials prior to removal.

### 3.09 SPECIALIZED SALVAGE

- A. Ozone Depleting Substances (ODS):
  - 1. Class I and Class II ODS are defined in Section 602(a) and (b), of The Clean Air Act. Prevent discharge of Class I and Class II ODS to the atmosphere. Place recovered ODS in cylinders meeting AHRI Guideline K suitable for the type ODS (filled to no more than 80 percent capacity) and provide appropriate labeling.
  - 2. Dispose of all Class I and Class II ODS refrigerants in accordance with the Clean Air Act Amendment of 1990.
  - 3. Products, equipment and appliances containing ODS in a sealed, self-contained system (e.g., residential refrigerators and window air conditioners) shall be disposed of in accordance with 40 CFR 82.
- B. Fire Suppression Containers: Fire suppression system cylinders and canisters with electrical charges or initiators shall be deactivated prior to shipment. Also, safety caps shall be used to cover exposed actuation mechanisms and discharge ports on these special cylinders.

3.10 UNSALVAGEABLE MATERIAL

- A. All unsalvageable material, except concrete permitted to remain in place, shall be disposed of off site weekly by the Contractor.
- B. Universal Waste Lamps and Thermostats: Dispose of in strict accordance with 40 CFR 273.

**END OF SECTION**



**SECTION 03 01 32**  
**REPAIR OF VERTICAL AND OVERHEAD CONCRETE SURFACES**

**PART 1      GENERAL**

**1.01      REFERENCES**

A.    The following is a list of standards which may be referenced in this section:

1.    American Concrete Institute (ACI):
  - a.    301, Specifications for Structural Concrete.
  - b.    506.2, Specification for Shotcrete.
2.    ASTM International (ASTM):
  - a.    A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
  - b.    A706/A706M, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
  - c.    A1064/A1064M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain, and Deformed, for Concrete.
  - d.    C42/C42M, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
  - e.    C78/C78M, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
  - f.    C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
  - g.    C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
  - h.    C348, Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
  - i.    C496/C496M, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
  - j.    C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
  - k.    C596, Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement.
  - l.    C666/C666M, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
  - m.    C882/C882M, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
  - n.    C1202, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.

- o. C1583/C1583M, Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).
- p. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
- q. D4259, Standard Practice for Abrading Concrete.
- r. E699, Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

## 1.02 DEFINITIONS

- A. Abrasive Blasting: Surface preparation method that uses compressed air intermixed with an abrasive medium to clean surface of substrate concrete, exposed steel, and steel reinforcement. Compressed air and abrasive medium is projected at high speed through a nozzle directly at the surface. Method is used to remove corrosion by-products, laitance, or other materials that may inhibit bond of repair concrete.
- B. Defective Area: As defined in Section 03 30 00, Cast-in-Place Concrete.
- C. High-Pressure Water Blasting: Sometimes referred to as hydro-demolition. Uses water that may contain an abrasive medium, projected under high pressure and high velocity. Used for demolition, cutting, partial or full depth removal, cleaning, scarifying, or roughening of concrete surfaces, or removing existing coatings, for preparation of substrate concrete surfaces.
- D. Low-Pressure Spray Mortar: Mortar suitable to be applied by low-pressure spraying, and in small areas may be applied by hand troweling.
- E. New Concrete: As defined in Section 03 30 00, Cast-in-Place Concrete.
- F. Rebound: Shotcrete material, mostly aggregates, that bounce off a surface against which shotcrete was projected.
- G. Shotcrete: Mortar pumped through hose and projected at high velocity.

## 1.03 SUBMITTALS

- A. Action Submittals:
  - 1. Product data sheets for each material supplied.
  - 2. Samples: Mesh reinforcement and mesh anchor.



3. Drawings supplemented by photographs indicating location, size, estimated quantity, and proposed repair mortar for each repair location in existing concrete.
4. Drawings indicating results of sounding for hollow areas including location, size, and estimated quantity of hollow-sounding areas for each repair location.

B. Informational Submittals:

1. Repair Mortar System: Manufacturer's preparation and installation instructions.
2. Mesh manufacturer's installation instructions and allowable load criteria.
3. Written description of equipment proposed for concrete removal and surface preparation.
4. Certificates:
  - a. Shotcrete Nozzleman: Current ACI Certification for each proposed nozzleman.
  - b. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, that proposed repair mortar systems are prepackaged, shrinkage compensated, specially designed for use on vertical and overhead surfaces that are exposed to weather.
  - c. Mortar Manufacturer's Certificate of Proper Installation.
5. Statements of Qualification: Repair mortar system applicator.
6. Field and laboratory test reports.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Repair Mortar System Applicator:
  - a. For Repair System A – Shotcrete Mortar, trained and experienced applicator recognized or certified by repair mortar system manufacturer.
  - b. For Repair System B – Low-Pressure Spray Mortar, in lieu of recognition or certification, demonstrate application of repair mortar manufacturer's system and obtain Certification of Proper Installation, in accordance with Article Manufacturer's Services.
2. Repair Mortar System Manufacturer's Representative: Knowledgeable and experienced on technical data and application requirements for specified products.

B. Demonstration for Repair System A – Shotcrete Mortar Repair System:

1. For each noted type of repair mortar system to be used, prepare one demonstration mockup in vertical orientation of at least 10 feet by 10 feet with average thickness, and containing reinforcement, representative of area being repaired on Project. Alternatively, a repair area in vertical orientation that is representative of areas to be repaired in terms of size, thickness, and reinforcement, may be used for demonstration in lieu of mockups; subject to acceptance by Owner.
2. Repair Mortar System Manufacturer's Demonstration:
  - a. Schedule time for manufacturer's demonstration of repair system proposed for Project.
  - b. Prepare mortar to specified consistency for testing and placement.
  - c. Cure portions of each type of surface to be repaired using proposed curing procedure and materials, including overhead and vertical applications.
  - d. Prepare surface area in advance of demonstration and obtain manufacturer's acceptance of preparation for each type of application.
  - e. Demonstrate the following:
    - 1) Mixing and application equipment capabilities and procedures, including flow of material from nozzle or sprayer.
    - 2) Nozzle operator, capabilities and ability to follow prescribed application procedures and properly operate equipment and apply surface repair materials.
  - f. Compression Strength Test: Make compression test samples from wet mortar during demonstration placement and deliver to independent testing laboratory for testing at 7 days and 28 days.
  - g. Tensile Bond Test: Test in situ for tensile bond at 7 days as specified in Paragraph Direct Tension Bond Test.

C. Where Required by Engineer: Demonstration Mockup for Repair System C – Polymer Modified Repair Mortar System:

1. Prepare a repair area in each vertical and overhead orientation that is representative of areas to be repaired in terms of size, thickness, and reinforcement, as may be used for a demonstration.
2. Repair Mortar System Manufacturer's Demonstration:
  - a. Schedule time for manufacturer's demonstration of repair system proposed for Project.
  - b. Prepare mortar to specified consistency, for testing and placement.
  - c. Cure portions of each type of surface to be repaired using proposed curing procedure and materials, including overhead and vertical applications.

- d. Prepare surface area in advance of demonstration and obtain manufacturer's acceptance of preparation for each type of application.
- e. Demonstrate mixing and application procedures.
- f. Compression Strength Test: Make compression test samples from wet mortar during demonstration placement and deliver to independent testing laboratory for testing at 7 days and 28 days.
- g. Tensile Bond Test: Test in situ for tensile bond at 7 days as specified in Paragraph Direct Tension Bond Test.

D. Pre-repair Conference:

- 1. Required Meeting Attendees:
  - a. Contractor.
  - b. Repair Subcontractor.
  - c. Engineer.
- 2. Schedule and conduct prior to conducting mockups and incorporation of respective products into Project. Notify Engineer of location and time.
- 3. Agenda shall include, but not limited to:
  - a. Review of field conditions. Conduct field observations of Work to be performed.
  - b. Based on above observations, confirm material selection and make Project-specific repair method recommendations.
  - c. Review proposed surface preparation, material application, consolidation, finishing, curing, and protection of repair material from weather conditions.
  - d. Other specified requirements requiring coordination.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package repair mortar system products in moisture-resistant bags, pails, or moisture-resistant bulk bags.
- B. Deliver, store, and handle repair materials in accordance with manufacturer's printed instructions.

**PART 2 PRODUCTS**

2.01 REPAIR SYSTEM A – SHOTCRETE MORTAR

- A. Mortar Materials:
  - 1. Blend of selected portland cements, microsilica, and specially graded aggregates and fibers applicable for vertical and overhead surfaces.
  - 2. Materials shall not contain asbestos, chlorides, nitrates, added gypsum, added lime, or high aluminum cements.

3. Noncombustible before and after cure.
4. Furnish in factory proportioned unit.
5. Workability from 1/4 inch in depth and greater.

B. Mixed Mortar Properties:

1. Working Time: 5 minutes to 10 minutes.
2. Finishing Time: 10 minutes to 20 minutes.
3. Color: Dark gray.

C. Cured Mortar Properties:

1. Compressive strength for 2-inch cubes in accordance with ASTM C109/C109M, or 3-inch cubes in accordance with manufacturer's modification to ASTM C109/C109M:
  - a. 7 Days: 6,000 psi minimum.
  - b. 28 Days: 7,000 psi minimum.
2. Flexural Strength (Modulus of Rupture), ASTM C78/C78M or ASTM C348 (Modified) at 28 Days: 1,100 psi minimum.
3. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 400 psi minimum.
4. Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 1,000 coulombs maximum.
5. Mortar shall not produce a vapor barrier.

D. Manufacturers and Products:

1. Master Builders Solutions US, Shakopee, MN; MasterEmaco S 211SP.
2. Sika Corp., Lyndhurst, NJ; SIKACEM 103F.
3. Euclid Chemical Co., Cleveland, OH; Eucoshot F.

2.02 REPAIR SYSTEM B – LOW-PRESSURE SPRAY MORTAR

- A. Cement based, fiber reinforced, shrinkage compensated, gray in color, with a minimum 30-minute working time.
- B. Cured materials mixed in accordance with manufacturer's instructions shall conform to the following criteria:
1. Compressive Strength, ASTM C109/C109M at 28 Days: 6,000 psi minimum.
  2. Flexural Strength, ASTM C348 at 28 Days: 1,100 psi minimum.
  3. Slant Shear Bond Strength, ASTM C882/C882M Test Method Modified with No Bonding Agent, at 28 Days: 3,000 psi minimum.
  4. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 600 psi minimum.

5. Drying Shrinkage, ASTM C157/C157M Modified at 28 Days or ASTM C531: 0.1 percent maximum.
6. Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 1,000 coulombs maximum.
7. System shall not produce a vapor barrier.
8. Sprayable, extremely low permeability, sulfate resistant, easy to use and requiring only addition of water.
9. Free of chlorides and other chemicals causing corrosion.

C. Manufacturers and Products:

1. Master Builders Solutions US, Shakopee, MN; MasterEmaco S 488CI.
2. Sika Corp., Lyndhurst, NJ; SikaRepair 224.
3. Euclid Chemical Co., Cleveland, OH; Tamms Structural Mortar.

2.03 REPAIR SYSTEM C – POLYMER-MODIFIED REPAIR MORTAR

- A. Polymer-modified, cementitious based, chloride resistant, flowable, gray in color, working time of 20 minutes minimum, surface renovation mortar.

B. Cured Mortar Properties:

1. Compressive Strength, ASTM C109/C109M at 28 Days: 7,000 psi minimum.
2. Flexural Strength, ASTM C348 at 28 Days: 1,200 psi minimum.
3. Slant Shear Bond Strength, ASTM C882/C882M Test Method Modified with No Bonding Agent at 28 Days: 2,000 psi minimum.
4. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 500 psi minimum.
5. Drying Shrinkage, ASTM C596 at 28 Days: 0.12 percent maximum. Not required for small repair areas approximately 1 square foot in area or less.
6. Freeze Thaw Resistance, ASTM C666/C666M, at 300 Cycles: 90 percent RDM.
7. Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 800 coulombs maximum for liquid holding and belowgrade repairs.

C. Manufacturers and Products:

1. Sika Corp., Lyndhurst, NJ; SikaTop 123 PLUS.
2. Euclid Chemical Co., Cleveland, OH; DuralTop Gel.

2.04 REPAIR SYSTEM D – SITE-MIXED PORTLAND-CEMENT MORTAR

A. Mortar Materials:

1. Use same materials as concrete to be repaired with no coarse aggregate, per Section 03 30 00, Cast-in-Place Concrete. Use of 3/8-inch nominal pea gravel acceptable where repairs are in excess of 1 inch deep.
2. For repairs to exposed concrete, make trial batches to check color compatibility of repair mortar with existing surrounding concrete.
3. Repairs Exposed to View in Finished Construction: Substitute white portland cement for part of the gray portland cement to produce desired color closely matching color of surrounding concrete.

2.05 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards, as specified in Section 03 30 00, Cast-in-Place Concrete.

2.06 REINFORCEMENT

- A. Deformed Steel Reinforcement: Per Section 03 21 00, Steel Reinforcement.
- B. Mesh Reinforcement: Welded wire fabric flat sheets with spacing of wires and wire size in accordance with ASTM A1064/A1064M, wire 75 ksi minimum tensile strength.
- C. Tie Wire: 16-gauge.
- D. Mesh Anchors:
1. Manufacturers and Products:
    - a. Powers Fastening, Inc., Brewster, NY; Tie Wire Version of Power-Stud.
    - b. Hilti Fastener Systems, Tulsa, OK; Kwik Bolt II HHDCA, 1/4-inch ceiling hanger.

2.07 CEMENTITIOUS BONDING AGENT AND REINFORCEMENT COATING

- A. Cementitious adhesive, specifically formulated for bonding plastic portland cement concrete or mortar to hardened portland cement concrete.
1. Mixed Bonding Agent Properties:
    - a. Pot Life: 75 minutes to 105 minutes.
    - b. Contact Time: 24 hours.
    - c. Color: Concrete gray.

2. Cured Cementitious Adhesive Properties:
  - a. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 500 psi minimum.
  - b. Flexural Strength, ASTM C348: 1,000 psi minimum.
    - 1) Slant Shear Bond Strength, ASTM C882/C882M at 14 Days:
    - 2) 2-Hour Open Time: 2,500 psi minimum.
    - 3) 24-Hour Open Time: 2,000 psi minimum.
3. Bonding agent shall not produce a vapor barrier.
4. Compatible with and from same manufacturer as the repair system used.

B. Manufacturers and Products:

1. Master Builders Solutions US, Shakopee, MN; MasterEmaco P 124.
2. Sika Corp., Lyndhurst, NJ; Sika Armatec 110 EpoCem.
3. Euclid Chemical Co., Cleveland, OH: Dural Prep AC.

2.08 EVAPORATION RETARDANT

- A. As specified in Section 03 39 00, Concrete Curing.

2.09 CURING COMPOUND

- A. As specified in Section 03 39 00, Concrete Curing.

**PART 3 EXECUTION**

3.01 GENERAL

- A. New Concrete Work: Repair deficiencies in new concrete structures constructed under this Contract with applicable repair system. Refer to Section 03 30 00, Cast-in-Place Concrete.
- B. Existing Concrete Work: Repair concrete as identified in Contract Documents.

3.02 APPLICATION

- A. General:
1. Repair System A: Large areas and number of repair areas.
  2. Repair System B: Medium to large areas and number of repair areas.
  3. Repair System C: Small and limited areas and number of repair areas.
  4. Repair System D: Concrete that contains coloring admixture.

### 3.03 PREPARATION

- A. Identify unsound and deteriorated concrete by sounding techniques, or as directed by Engineer, and review proposed extent of repair with Engineer.
- B. Remove unsound, honeycombed, deteriorated, or otherwise defective areas of concrete from work areas.
  - 1. Use 8,000 psi minimum high-pressure abrasive- or water abrasive-blasting machine as required for Site conditions.
  - 2. Remove concrete to abrade substrate concrete surfaces to a minimum amplitude roughness of 3/16 inch measured between high and low points with a 3-foot-long straightedge, in accordance with ASTM D4259.
  - 3. For existing structures, extent of concrete removal as shown on Drawings.
  - 4. Where final surface is required to be flush with existing adjacent surface remove existing concrete depth as required for application of minimum thickness of repair mortar.
- C. Do not use power-driven jackhammers, chipping hammers, or scabblers unless water blasting is not permitted or practical because of Site conditions, or may cause other damage to equipment or facilities. In such cases where chipping hammers are required, limit size of chipping hammer to 16 pounds or lighter, or use small electric chipping hammer, to reduce formation of micro-fractures in substrate concrete surface.
- D. Following removal of unsound or deteriorated concrete, check substrate concrete surface by sounding techniques to identify unsound concrete remaining or resulting from use of chipping hammer.
- E. Remove unsound concrete to satisfaction of Engineer.
- F. Square edges of patch areas by sawing or chipping to avoid tapered shoulders or feathered edges. Avoid cutting embedded steel reinforcement. Roughen polished saw-cut edge by high-pressure water-abrasive blasting or abrasive blasting.
- G. Remove concrete adjacent to steel reinforcement to a minimum of 1-inch clearance around steel reinforcement for application and bonding of new repair mortar to circumference of exposed steel reinforcement if one or more of the following surface conditions exist:
  - 1. 50 percent or more of circumference around steel reinforcement is exposed during concrete removal.



2. 25 percent or more of circumference around steel reinforcement is exposed during concrete removal and corrosion is present to extent that more than 25 percent loss of section has occurred.
  3. Otherwise evident that bond between existing concrete and steel reinforcement has been destroyed or has deteriorated as determined by Engineer.
- H. Clean exposed steel reinforcement of loose rust and concrete splatter per recommendations of repair material manufacturer and in accordance with ASTM D4258.
- I. Keep areas from which concrete has been removed free of dirt, dust, and water blasting waste slurry. Remove laitance and other bond inhibiting contaminants from prepared areas.
- J. Dampen repair areas at least 6 inches beyond area to receive repair mortar for at least 24 hours to provide saturated surface dry (SSD) condition without standing water at time of application of mortar as required by and in accordance with repair mortar manufacturer's printed instructions.
- K. Collect and dispose of spent water and concrete debris from removal operations offsite in manner and location acceptable to Owner.

#### 3.04 REINFORCEMENT INSTALLATION

- A. Provide steel reinforcement when existing reinforcement is not exposed, and when mortar application is more than 3 inches deep, unless otherwise shown on Drawings.
- B. Replace deteriorated steel reinforcement with new steel reinforcement equivalent in cross-sectional area to original steel reinforcement.
- C. Install mesh anchors in accordance with mesh manufacturer's instructions.
- D. Fasten steel reinforcement to mesh anchors with tie wire to prevent from moving during placement of repair mortar.
- E. Lap reinforcement mesh a minimum of one mesh spacing and securely fasten mesh to mesh anchors, or to reinforcement fastened to mesh anchors, with tie wire at intervals no more than 12 inches to prevent movement during application of repair mortar.
1. Cementitious bonding agent and reinforcement coating shall not be applied to repair areas where color of repair shall match adjacent concrete.

3.05 PROTECTION

- A. If cementitious coating or bonding agent is used, protect adjacent surfaces from over application. Promptly remove bonding agent applied beyond repair area.
- B. Protect adjacent surfaces, and equipment, from being damaged by overshooting, rebound, and dust, from repair mortar system.

3.06 REPAIR SYSTEM A – SHOTCRETE MORTAR PLACEMENT

- A. Apply shotcrete mortar in accordance with manufacturer's instructions.
- B. Do not reuse rebound materials.
- C. Apply mortar using dry mix process, in accordance with ACI 506.2.
- D. Shotcrete mortar shall emerge from nozzle in a steady, uninterrupted flow. If flow becomes intermittent, direct flow away from the Work until flow of mortar becomes constant.
- E. Applied Shotcrete Mortar: Minimum thickness of 1-1/2 inches of cover over existing reinforcement, or to level of surrounding concrete surface, whichever results in thicker coat.
- F. Nozzle Position: Hold nozzle approximately at right angles to and at a distance from surface in accordance with shotcrete repair mortar system manufacturer's instructions for type of application, nozzle, and air pressure used.
- G. Steel Reinforcement Encasement:
  - 1. Modify procedure of shooting shotcrete mortar to better direct material around reinforcement bars.
  - 2. Prevent shotcrete mortar from building up on reinforcement steel when shooting on, around, through, and behind steel to eliminate voids.
  - 3. Provide dense void-free encasement of reinforcement steel.
- H. Shotcreting More than One Layer: In accordance with shotcrete repair mortar system manufacturer's printed instructions.
- I. Slice off excess material with a wire screed approximately 5 minutes to 10 minutes after initial set.
- J. Apply wood float finish to exposed shotcrete mortar surface.

K. Rebound Removal: Continuously throughout shotcrete mortar application, remove rebound, sand, and miscellaneous debris, and dispose off Site at an approved disposal facility.

L. Cure as specified in Article Curing.

3.07 REPAIR SYSTEM B – LOW-PRESSURE SPRAY MORTAR PLACEMENT

A. Mix mortar in accordance with manufacturer's printed instructions.

B. After priming prepared substrate concrete surface per manufacturer's recommendations, apply mortar by low-pressure spraying equipment, unless noted otherwise.

C. Bonding Agent:

1. Use bonding agent when manufacture required for hand applied areas, in accordance with repair mortar manufacturer's instructions.
2. Application of repair mortar over bonding agent shall be completed within time frame recommended by bonding agent manufacturer.
3. Consult with manufacturer for optimum and minimum acceptable degrees of surface tackiness of coat.

D. Work mortar firmly and quickly into repair area.

E. Finish repair mortar to match adjacent concrete surface.

F. Provide evaporation retardant at full strength.

G. Cure as specified in Article Curing.

3.08 REPAIR SYSTEM C – POLYMER-MODIFIED REPAIR MORTAR PLACEMENT

A. Mix mortar in accordance with manufacturer's printed instructions.

B. Bond Coat: Apply to prepared substrate concrete surface before application of mortar in accordance with repair mortar manufacturer's printed instructions. Do not apply more bond coat than can be covered with mortar before bond coat dries. Do not retemper bond coat.

C. Place mortar by hand or low-pressure spray and trowel to specified surface finish, in accordance with requirements of repair material's printed instructions.

- D. Finish repair mortar to smooth even surface to match adjacent concrete surface.
- E. Cure as specified in Article Curing, and in accordance with manufacturer's printed instructions.

3.09 REPAIR SYSTEM D – SITE-MIXED PORTLAND-CEMENT REPAIR MORTAR PLACEMENT

- A. Use site-mixed portland-cement repair mortar on surfaces of concrete that has coloring admixture.
- B. Prepare mortar to a stiff consistency with no more mixing water necessary for handling and placing.
- C. Mix site-mixed portland-cement repair mortar in accordance with requirements of ACI 301.
- D. Apply scrub coat of mortar worked into existing substrate surface with a stiff bristled brush. Use of epoxy resin bonding agent is not acceptable.
- E. Work mortar firmly and quickly into repair area before scrub slurry coat begins to dry.
- F. Finish repair mortar to match adjacent concrete surface.

3.10 CURING

- A. Prior to curing, apply water fog to repair mortar system in accordance with repair mortar system manufacturer's printed instructions.
- B. Cure in accordance with repair mortar manufacturer's printed instructions.
- C. Where permitted by repair mortar manufacturer's printed instructions, commence moist curing after repair mortar system application and when curing will not cause erosion of mortar.
- D. Continuously moist cure repair mortar system for a period of 7 days.
- E. Do not cure using curing compound or membrane, unless method is part of repair mortar system manufacturer's printed instructions and approval is obtained from Engineer.

- F. Cure intermediate layers of repair mortar in accordance with repair mortar manufacturer's printed instructions.
- G. Where curing compound is permitted by repair mortar system manufacturer, apply curing compound in accordance with Section 03 39 00, Concrete Curing.

### 3.11 FIELD QUALITY CONTROL

- A. Sounding for Hollow Areas:
  - 1. Light hammer tap repaired areas listening for hollow sound to determine areas that have not properly bonded to substrate concrete.
  - 2. Mark hollow areas for removal and replacement.
- B. Compression Strength Test:
  - 1. Test in accordance with ASTM C109/C109M, except modified by making samples using repair mortar.
  - 2. Obtain production samples of mixed wet mortar materials from nozzle, or mixer, during construction for compliance with Specifications for testing at 7 days, and 28 days.
  - 3. Provide a minimum of three samples for each 1,000 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing.
  - 4. Record location where repair mortar is being applied at time production samples are obtained.
- C. Direct Tension Bond Test:
  - 1. In Situ Bond Testing: Perform tension bond test in accordance with ASTM C1583/C1583M.
  - 2. Record locations on in situ bond tests on each type of applied repair mortar.
  - 3. Acceptance Bond Strength of Repair Mortar to Substrate Concrete: 200 psi minimum in direct tension without failure or movement.
- D. Testing laboratory retained by Owner will provide the following:
  - 1. Compression Strength Test:
    - a. Testing will follow a "modified" ASTM C109/C109M.
    - b. A minimum of three production samples of mixed material will be obtained from each 1,000 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing at 7 days, and 28 days.
    - c. Record location where repair mortar is being applied at time production samples are obtained.

2. Direct Tension Bond Test:
  - a. Two core samples will be obtained and tested for each 2,000 square feet of repair work.
  - b. Cores will be 2-1/2-inch or 3-inch diameter to a total depth equal to at least 2.5 times repair mortar thickness.
  - c. Bond Strength of Repair Mortar to Substrate Concrete: 200 psi minimum in direct tension without failure or movement.
  - d. Record locations of Bond Tests on each type of applied repair mortar tested.

E. Retest mortar repairs that do not meet test requirements.

F. Repair and fill holes using same repair mortar where core samples have been removed.

### 3.12 MORTAR REPAIR FAILED TEST

- A. Remove and replace unacceptable Work.
- B. Hollow Sounding Areas: Saw cut hollow sounding areas to a new square edge. Remove unsound mortar repair. Prepare substrate surface and reapply repair mortar as specified herein above.
- C. Failed Compression Strength Test: Remove affected areas of repair mortar represented by failed compression strength test results. Prepare substrate surface and reapply repair mortar as specified herein above.
- D. Failed Bond Tests: Remove affected areas of repair mortar represented by failed bond test results. Prepare substrate surface and reapply repair mortar as specified herein above.
- E. Retest areas where repair mortar was removed and replaced, in accordance with test requirements specified herein above.

### 3.13 MANUFACTURER'S SERVICES

- A. Provide repair mortar system manufacturer's representative at Site to review acceptability of surface preparation, mixing and installation assistance, training of repair mortar system applicators, inspection, and Certification of Proper Installation.

3.14 CLEANING

- A. Remove overshot shotcrete and overspray of low-pressure spray, repair mortar and rebound materials as the Work proceeds. Remove waste materials, unsound material from concrete surfaces, material chipped from structure, and water used in preparation of or repair areas, finishing, and curing, and dispose offsite at an approved disposal site.

**END OF SECTION**





**SECTION 03 01 33**  
**REPAIR OF HORIZONTAL CONCRETE SURFACES**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    American Association of State Highway and Transportation Officials (AASHTO): T277, Standard Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
  2.    ASTM International (ASTM):
    - a.    A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
    - b.    A706/A706M, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
    - c.    A1064/A1064M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain, and Deformed, for Concrete.
    - d.    C42/C42M, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
    - e.    C78/C78M, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
    - f.    C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
    - g.    C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
    - h.    C348, Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
    - i.    C469, Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.
    - j.    C496/C496M, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
    - k.    C666/C666M, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
    - l.    C779/C779M, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
    - m.    C882/C882M, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
    - n.    C928/C928M, Standard Specification for Packaged, Dry, Rapid-Hardening Cementitious Materials for Concrete Repairs.

- o. C1012/C1012M, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
- p. C1202, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
- q. C1583/C1583M, Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).
- r. D638, Standard Test Method for Tensile Properties of Plastics.
- s. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
- t. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
- u. D4259, Standard Practice for Abrading Concrete.
- v. E699, Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

## 1.02 DEFINITIONS

- A. Abrasive Blasting: Surface preparation method that uses compressed air intermixed with an abrasive medium to clean surface of substrate concrete, exposed steel, and steel reinforcement. Compressed air and abrasive medium is projected at high speed through a nozzle directly at the surface. Method is used to remove corrosion by-products, laitance, or other materials that may inhibit bond of repair concrete.
- B. Defective Area: As defined in Section 03 30 00, Cast-in-Place Concrete.
- C. High-Pressure Water Blasting (sometimes referred to as hydro-demolition): Uses water that may contain an abrasive medium, projected under high pressure and high velocity. Used for demolition, cutting, partial or full depth removal, cleaning, scarifying, or roughening of concrete surfaces, or removing existing coatings, for preparation of substrate concrete surfaces.
- D. New Concrete: As defined in Section 03 30 00, Cast-in-Place Concrete.

### 1.03 SUBMITTALS

#### A. Action Submittals:

1. Product data sheets for each material supplied.
2. Drawings supplemented by photographs indicating location, size, estimated quantity, and proposed repair mortar system for each repair location in existing concrete.
3. Drawings indicating results of sounding for hollow areas including location, size, estimated quantity, of hollow-sounding areas for each repair location.

#### B. Informational Submittals:

1. Repair Mortar System: Manufacturer's preparation and installation instructions.
2. Written description of equipment proposed for concrete removal and surface preparation.
3. Certificates:
  - a. Manufacturer's Certificate of Compliance in accordance with Section 01 61 00, Common Product Requirements, that proposed repair mortar systems meet requirements of ASTM C928/C928M.
  - b. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, that repair mortar systems are prepackaged, shrinkage compensated, specially designed for use on horizontal surfaces that are exposed to weather and, receive traffic.
  - c. Mortar Manufacturer's Certificate of Proper Installation.
  - d. Confirmation epoxy resin bonding agents conform to ASTM C882/C882M.
4. Statements of Qualification: Repair mortar system applicator.
5. Field and laboratory test results.

### 1.04 QUALITY ASSURANCE

#### A. Qualifications:

1. Repair Mortar System Applicator: Trained and experienced applicator endorsed by repair mortar system manufacturer.
2. Repair Mortar System Manufacturer's Representative: Knowledgeable and experienced on technical data and application requirements for specified products.

B. Pre-repair Conference:

1. Required Meeting Attendees:
  - a. Contractor.
  - b. Repair Subcontractor.
  - c. Engineer.
2. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer of location and time.
3. Agenda shall include, but not limited to:
  - a. Review of field conditions. Conduct field observations of the Work to be performed.
  - b. Confirm material selection and make Project specific repair method recommendations.
  - c. Review proposed surface preparation, material application, consolidation, finishing, curing, and protection of repair material from weather conditions.
  - d. Other specified requirements requiring coordination.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package repair mortar system products in moisture-resistant bags, pails, or moisture-resistant bulk bags.
- B. Deliver, store, and handle repair materials in accordance with manufacturer's printed instructions.

**PART 2 PRODUCTS**

2.01 REPAIR MORTAR SYSTEM NO. 2—HIGH EARLY STRENGTH REPAIR MORTAR

- A. Fast-setting, high early strength repair mortar.
- B. Compressive Strength, ASTM C109/C109M:
  1. 2 Hours: 1,500 psi minimum.
  2. 1 Day: 4,500 psi minimum.
  3. 7 Days: 8,000 psi minimum.
  4. 28 Days: 9,000 psi minimum.
- C. Flexural Strength, ASTM C348:
  1. 1 Day: 850 psi minimum.
  2. 7 Days: 1,000 psi minimum.
  3. 28 Days: 1,100 psi minimum.

- D. Modulus of Elasticity, ASTM C469:
  - 1. 1 Day: 3.8 by  $10^6$  psi minimum.
  - 2. 28 Days: 4.5 by  $10^6$  psi minimum.
- E. Slant Shear Bond Strength, ASTM C882/C882M (Modified):
  - 1. 1 Day: 2,500 psi minimum.
  - 2. 7 Days: 2,900 psi minimum.
  - 3. 28 Days: 3,100 psi minimum.
- F. Splitting Tensile Strength, ASTM C496/C496M:
  - 1. 1 Day: 850 psi minimum.
  - 2. 7 Days: 1,200 psi minimum.
  - 3. 28 Days: 1,300 psi minimum.
- G. Freeze-thaw Resistance, ASTM C666/C666M, Procedure A, at 300 Cycles: 98 percent RDM.
- H. Chloride Ion Permeability Based on Charge Passed, ASTM C1202 or AASHTO T277, 28 Days: 960 coulombs maximum.
- I. Manufacturers and Products:
  - 1. Master Builders Solutions US, Shakopee, MN; MasterEmaco T 415.
  - 2. Euclid Chemical Co., Cleveland, OH; VersaSpeed.

2.02 REPAIR MORTAR SYSTEM NO. 3—SHRINKAGE COMPENSATED REPAIR MORTAR

- A. Cement-based, flowable, shrinkage compensated repair mortar system.
- B. Compressive Strength, ASTM C109/C109M:
  - 1. 1 Day: 2,500 psi minimum.
  - 2. 7 Days: 6,000 psi minimum.
  - 3. 28 Days: 8,000 psi minimum.
- C. Flexural Strength, ASTM C348 at 28 Days: 770 psi minimum.
- D. Modulus of Elasticity, ASTM C469 at 28 Days: 5.9 by  $10^6$  psi minimum.
- E. Slant Shear Bond Strength, ASTM C882/C882M Modified:
  - 1. 7 Days: 2,150 psi minimum.
  - 2. 28 Days: 3,000 psi minimum.

- F. Freeze-thaw Resistance, ASTM C666/C666M, Procedure A, at 300 Cycles: 97.0 percent RDM.
- G. Chloride Ion Permeability Based on Charge Passed, ASTM C1202 at 28 Days: 650 coulombs maximum.
- H. Sulfate Resistance, ASTM C1012/C1012M after 6 Months: 0.01 percent length change maximum.
- I. Manufacturers and Products:
  - 1. Master Builders Solutions US, Shakopee, MN; MasterEmaco S 466 CI.
  - 2. Euclid Chemical Co., Cleveland, OH; Eucocrete Supreme.

2.03 REPAIR MORTAR SYSTEM NO. 5—POLYMER MODIFIED REPAIR MORTAR

- A. Fast-setting, polymer modified cementitious based repair mortar system.
- B. Compressive Strength, ASTM C109/C109M:
  - 1. 1 Day: 2,500 psi minimum.
  - 2. 7 Days: 5,000 psi minimum.
  - 3. 28 Days: 7,000 psi minimum.
- C. Flexural Strength, ASTM C348 at 28 Days: 1,500 psi minimum.
- D. Slant Shear Bond Strength, ASTM C882/C882M Modified at 28 Days: 2,000 psi minimum.
- E. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 600 psi minimum.
- F. Abrasion Resistance Depth of Wear, ASTM C779/C779M, Procedure A, at 60 Minutes: 0.033 inch maximum.
- G. Drying Shrinkage, ASTM C157/C157M Modified, at 28 Days: 0.09 percent maximum.
- H. Rapid Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 28 Days: Under 850 coulombs maximum.
- I. Manufacturers and Products:
  - 1. Euclid Chemical Co., Cleveland, OH; Duraltop Flowable Mortar.
  - 2. Sika Corp., Lyndhurst, NJ; SikaTop 122 PLUS.

2.04 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards, as specified in Section 03 30 00, Cast-in-Place Concrete.

2.05 REINFORCEMENT

- A. Deformed Steel reinforcement: Per Section 03 21 00, Steel Reinforcement.
- B. Mesh Reinforcement: Welded wire fabric flat sheets with spacing of wires and wire size in accordance with ASTM A1064/A1064M, wire 75 ksi minimum tensile strength.
- C. Tie Wire: 16-gauge.
- D. Mesh Anchors:
  - 1. Manufacturers and Products:
    - a. Powers Fastening, Inc., Brewster, NY; Tie Wire Version of Power-Stud.
    - b. Hilti Fastener Systems, Tulsa, OK; Kwik Bolt II HHDCA, 1/4-inch ceiling hanger.

2.06 CEMENTITIOUS BONDING AGENT AND REINFORCEMENT COATING

- A. Cementitious adhesive, specifically formulated for bonding plastic portland cement concrete or mortar to hardened portland cement concrete.
  - 1. Mixed Bonding Agent Properties:
    - a. Pot Life: 75 minutes to 105 minutes.
    - b. Contact Time: 24 hours.
    - c. Cured Cementitious Adhesive Properties:
    - d. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 600 psi minimum.
    - e. Flexural Strength, ASTM C348: 1,000 psi minimum.
    - f. Slant Shear Bond Strength, ASTM C882/C882M:
      - 1) 2-Hour Open Time: 2,500 psi minimum.
      - 2) 24-Hour Open Time: 2,000 psi minimum.
  - 2. Bonding agent shall not produce a vapor barrier.
  - 3. Compatible with, and from same manufacturer as the, repair mortar system used.

B. Manufacturers and Products:

1. Master Builders Solutions US, Shakopee, MN; MasterEmaco P 124.
2. Sika Corp., Lyndhurst, NJ; Sika Armatec 110 EpoCem.
3. Euclid Chemical Co., Cleveland, OH; Dural Prep AC.

2.07 EPOXY BONDING AGENT

- A. Two-component, moisture insensitive, 100 percent solids epoxy resin.
- B. Tensile Strength, ASTM D638, at 14 Days: 4,400 psi minimum.
- C. Elongation at Break, ASTM D638: 1.49 percent minimum.
- D. Compressive Strength, ASTM D695, at 28 Days for Application Temperature of 73 Degrees F to 77 Degrees F: 8,000 psi minimum.
- E. Bond Strength, ASTM C882/C882M, at 14 Days: 1,800 psi minimum.
- F. Pot Life, at 73 Degrees F to 77 Degrees F: 75 minutes minimum.
- G. Manufacturers and Products:
  1. Master Builders Solutions US, Shakopee, MN; MasterEmaco ADH 326 when ambient temperature is 73 degrees F or higher.

2.08 EVAPORATION RETARDANT

- A. As specified in Section 03 39 00, Concrete Curing.

2.09 CURING COMPOUND

- A. As specified in Section 03 39 00, Concrete Curing.

**PART 3 EXECUTION**

3.01 GENERAL

- A. New Concrete Work: Repair deficiencies in new concrete structures constructed under this Contract with applicable repair system.
- B. Existing Concrete Work: Repair concrete as identified in Contract Documents.



### 3.02 APPLICATION

#### A. General:

1. Repair Mortar System No. 2 Patches, joints, or overlays 1/2 inch to 3 inches thick. Return to service in 3 hours to 7 days.
2. Repair Mortar System No. 3: Patches, joints, or overlays 1 inch thick or greater. Return to service in 7 days or more.
3. Repair Mortar System No. 5:
  - a. Patches and Overlays: 1/4 inch to 3 inches thick.
  - b. Return to service for foot traffic in 4 hours; wheel traffic in 7 days.
  - c. Working Time: 30 minutes at 70 degrees F.
  - d. Application Temperature Range: 45 degrees F to 90 degrees F.

### 3.03 PREPARATION

- A. Identify unsound and deteriorated concrete by sounding techniques, or as directed by Engineer. Review proposed extent of repair with Engineer.
- B. Remove unsound, deteriorated, or otherwise defective areas of concrete from Work areas.
  1. Use 8,000 psi minimum high-pressure water-abrasive or abrasive-blasting machine, as appropriate to suit Site conditions.
  2. Remove concrete to abrade substrate concrete surface to a minimum amplitude roughness of 3/16 inch measured between high and low points with a 3-foot-long straightedge, in accordance with ASTM D4259.
  3. For existing structures, extent of concrete removal as shown on Drawings.
  4. Where final surface is required to be flush with existing adjacent surface, remove existing concrete depth as required for application of minimum thickness of repair mortar.
- C. Do not use power-driven jackhammers, chipping hammers, scabblers, or scarifiers unless water blasting is not permitted or practical because of Site conditions, or may cause other damage to equipment or facilities. In such cases where chipping hammers are required, limit size of chipping hammer to 16 pounds or lighter, or use small electric chipping hammer, to reduce formation of micro-fractures in substrate concrete surface.
- D. Following removal of unsound or deteriorated concrete, check substrate concrete surface by sounding techniques to identify unsound concrete remaining or resulting from use of chipping hammer.

- E. Remove unsound concrete to satisfaction of Engineer.
- F. Square edges of patch areas by sawing or chipping to avoid tapered shoulders or featheredges. Avoid cutting embedded steel reinforcement. Roughen polished saw-cut edge by high-pressure water-abrasive blasting or abrasive blasting.
- G. Remove concrete adjacent to steel reinforcement to a minimum of 1-inch clearance around steel reinforcement for application and bonding of new repair mortar to entire circumference of exposed steel reinforcement if one or more of the following surface conditions exist:
  - 1. 50 percent or more of circumference around steel reinforcement is exposed during concrete removal.
  - 2. 25 percent or more of circumference around steel reinforcement is exposed during concrete removal and corrosion is present to extent that more than 25 percent loss of section has occurred.
  - 3. Otherwise evident that bond between existing concrete and steel reinforcement has been destroyed or has deteriorated as determined by Engineer.
- H. Clean exposed steel reinforcement of loose rust and concrete splatter per recommendations of repair material manufacturer and in accordance with ASTM D4258.
- I. Keep areas from which concrete has been removed free of dirt, dust, and water blasting waste slurry. Remove laitance and other bond inhibiting contaminants from prepared areas.
- J. Preparation of Substrate Concrete Surface in Areas to Receive Repair Mortar System Nos. 2, 3, and 5: Dampen repair areas at least 6 inches beyond area to receive repair mortar for at least 24 hours to provide saturated surface dry (SSD) condition without standing water at time of application of mortar, as required by and in accordance with repair mortar manufacturer's printed instructions.
- K. Spalled Joints:
  - 1. Saw cut edge 1 inch deep and 6 inches back from old joint.
  - 2. Remove unsound concrete and concrete between saw cut and joint.
  - 3. Place wood or fiber spacer to thickness of joint at joint line.

L. Overlays:

1. Square cut edges to a minimum of 1/4 inch deep.
2. Do not feather edge area.
3. Perform special preparation recommended by mortar manufacturer.

M. Collect and dispose of spent water and concrete debris from removal operations offsite in manner and location acceptable to Owner.

3.04 REINFORCEMENT INSTALLATION

- A. Provide steel reinforcement when existing steel reinforcement is not exposed and when mortar application is more than 4 inches deep, unless otherwise shown on Drawings.
- B. Replace deteriorated steel reinforcement with new steel reinforcement equivalent in cross-sectional area to original steel reinforcement.
- C. Install mesh anchors in accordance with mesh manufacturer's instructions.
- D. Fasten steel reinforcement to chairs or mesh anchors with tie wire to prevent from moving during placement of repair mortar.
- E. Lap reinforcement mesh a minimum of one mesh spacing and securely fasten mesh to mesh anchors, or to steel reinforcement fastened to mesh anchors, with tie wire at intervals no more than 12 inches to prevent movement during application of repair mortar.
- F. Coat exposed new and existing steel reinforcement with cementitious reinforcement coating at the same time as substrate concrete is coated, as specified below, per repair mortar and cementitious reinforcement coating manufacturers' printed instructions.

3.05 PROTECTION

- A. If cementitious coating or bonding agent is used, protect adjacent surfaces from over application. Promptly remove bonding agent applied beyond repair area.
- B. Protect adjacent surfaces, and equipment from spillage of repair mortar and dust, as applicable for repair mortar system used.

### 3.06 PLACEMENT

#### A. Repair Mortar System Nos 2, 3, and 5:

1. Remove standing and free water from prepared area.
2. Apply bond scrub coat of mortar to prepared surface in accordance with manufacturer's instructions. Do not apply more scrub coat of mortar than can be covered with repair mortar before scrub coat begins drying.
3. Immediately place mixed repair mortar into prepared area from one side to the other side.
4. Work material firmly into bottom and sides of patch to ensure a good continuous bond.
5. Level repair mortar and screed to elevation of existing concrete.
6. Finish to same texture as existing concrete around patch.
7. Repair Mortar System No. 5 screed or use self-leveling mixture to obtain a uniform and plane surface.

#### B. Joint Repair:

1. Remove joint spacer when repair mortar is hard enough that a pointed trowel will penetrate surface less than 1/2 inch.
2. When repair mortar is cured and ready for use, fill joint in accordance with repair mortar system manufacturer's instructions.

### 3.07 FINISHING

- #### A.
- Spray full strength evaporation retardant on fresh concrete to prevent rapid drying during hot and windy weather.

### 3.08 CURING

- #### A.
- Repair Mortar System Nos. 2, 3, 4, or 5: Apply curing compound in accordance with Section 03 39 00, Concrete Curing.

### 3.09 FIELD QUALITY CONTROL

#### A. Sounding for Hollow Areas:

1. Chain drag or light hammer tap repaired areas listening for hollow sound to determine areas that have not properly bonded to substrate concrete.
2. Mark hollow areas for removal and replacement.

B. Compression Strength Test:

1. Test in accordance with ASTM C109/C109M, except modified by making samples using repair mortar.
2. Obtain production samples of mixed materials from mixer during construction for compliance with Specifications.
3. Provide minimum of three samples for each 200 square feet of mortar repair, and a minimum of three samples in total, whichever is greater for testing.
4. Record location where repair mortar is being applied at time production samples are obtained.

C. Direct Tension Bond Test:

1. In Situ Bond Testing: Perform tension bond test in accordance with ASTM C1583/C1583M.
2. Record locations on in situ bond tests on each type of applied repair mortar.
3. Acceptance Bond Strength of Repair Mortar to Substrate Concrete: 200 psi minimum in direct tension without failure or movement.

D. Testing laboratory retained by Owner will provide the following:

1. Compression Strength Test:
  - a. Testing will follow a “modified” ASTM C109/C109M.
  - b. A minimum of three production samples of mixed material will be obtained from each 200 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing at 7 days, and 28 days.
  - c. Record location where repair mortar is being applied at time production samples are obtained.
2. Direct Tension Bond Test:
  - a. Two core samples will be obtained and tested for each 2,000 square feet of repair work.
  - b. Cores will be 2-1/2-inch or 3-inch diameter to a total depth equal to at least 2.5 times repair mortar thickness.
  - c. Bond Strength of Repair Mortar to Substrate Concrete: 300 psi minimum in direct tension without failure or movement.
  - d. Record locations of bond tests on each type of applied repair mortar tested.

E. Retest mortar repairs that do not meet test requirements.

F. Repair and fill holes using same repair mortar where core samples have been removed.

3.10 MORTAR REPAIR FAILED TEST

- A. Remove and replace unacceptable Work.
- B. Hollow Sounding Areas: Saw cut hollow sounding areas to a new square edge, remove unsound mortar repair. Prepare substrate surface and reapply repair mortar as specified herein above.
- C. Failed Compression Strength Test: Remove affected areas of repair mortar represented by failed compression strength test results. Prepare substrate surface and reapply repair mortar as specified herein above.
- D. Failed Bond Tests: Remove affected areas of repair mortar represented by failed bond test results. Prepare substrate surface and reapply repair mortar as specified herein above.
- E. Retest areas where repair mortar was removed and replaced, in accordance with test requirements specified herein above.

3.11 MANUFACTURERS' SERVICES

- A. Provide mortar manufacturer's representative at Site to advice on product selection, review acceptability of surface preparation, mixing and installation assistance, inspection, and Certification of Proper Installation.

3.12 CLEANING

- A. Remove excess repair mortar materials as the Work proceeds. Remove waste materials, unsound material from concrete surfaces, material chipped from structure, and water used in preparation of repair areas, finishing, and curing, and dispose offsite at approved disposal site.

**END OF SECTION**

**SECTION 03 10 00  
CONCRETE FORMING AND ACCESSORIES**

**PART 1      GENERAL**

**1.01      GENERAL**

- A. Unless otherwise specified, Work shall conform to requirements of Section 1 through Section 5 of ACI 301, Specifications for Structural Concrete.

**1.02      REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
  - 1. American Concrete Institute (ACI):
    - a. 301, Specifications for Structural Concrete.
  - 2. ASTM International Standards (ASTM):
    - a. A1034/A1034M, Standard Test Methods for Testing Mechanical Splices for Steel Reinforcing Bars.
    - b. A1094/A1094M, Standard Specification for Continuous Hot-Dip Galvanized Steel Bars for Concrete Reinforcement.
    - c. C1761/C1761M, Standard Specification for Lightweight Aggregate for Internal Curing of Concrete.
    - d. C1797, Standard Specification for Ground Calcium Carbonate and Aggregate Mineral Fillers for use in Hydraulic Cement Concrete.

**1.03      DEFINITIONS**

- A. Defective Areas: See definition in Section 03 30 00, Cast-in-Place Concrete.
- B. Exposed Concrete: See definition in Section 03 30 00, Cast-in-Place Concrete.
- C. Unless otherwise specified, definitions shall be in accordance with Paragraph 1.3, Definitions, of ACI 301 and Section 03 30 00, Cast-in-Place Concrete.
  - 1. Water-cementitious materials ratio (w/cm): Ratio of mass of water, excluding that absorbed by the aggregate, to the mass of cementitious materials in a mixture, stated as a decimal.
- D. Unless otherwise specified, limit deflection of facing materials for concrete surfaces to comply with ACI 301. Limit deflection of facing materials to comply with tolerance limits established by Contract Documents and with tolerances required by equipment manufacturers. Coordinate tolerance requirements with equipment manufacturers.

## 1.04 SUBMITTALS

- A. Unless otherwise specified, submittals shall be in accordance with ACI 301, Article 2.1.2 *Submittals*.
- B. Action Submittals:
  - 1. Construction and Movement Joints.
  - 2. Manufacturer's Product Data on Formwork Release Agent for Use on Each Form-Facing Material.
  - 3. Manufacturer's Data Sheet for Form Ties.
  - 4. Manufacturer's Data Sheet for Formwork Materials Not Listed Elsewhere in Contract Documents, That Are to Be Left in Place Within Work.
- C. Informational Submittals: Reshoring and Backshoring Procedure.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Unless otherwise specified, in accordance with ACI 301, Article 2.2.1 *Materials*.
- B. Materials:
  - 1. Form-facing Materials: Where steel forms are used, treat steel surfaces to prevent rusting using products approved for use on steel forms.
  - 2. Formwork Accessories.
    - a. Form Snap-Ties:
      - 1) Material:
        - a) Unless otherwise specified: Steel.
      - 2) Spreader Inserts:
        - a) Conical or spherical type.
        - b) Design to maintain positive contact with forming material.
        - c) Furnish units that will leave no metal closer than 1.5 inches to concrete surface when forms, inserts, and tie ends are removed.
      - 3) Wire ties not permitted.
      - 4) Flat bar ties for panel forms; furnish plastic or rubber inserts with minimum 1.5-inch depth and sufficient dimensions to permit patching of tie hole.



- 5) Form Snap-Ties with Water Stop:
  - a) For hydraulic structures, elevator pit, pipe galleries, and accessible spaces below finish grade, furnish one of the following:
    - (1) Integral steel waterstop 0.103-inch thick and 0.625-inch diameter tightly and continuously welded to tie.
    - (2) Neoprene water stop 3/16-inch thick and 15/16-inch diameter that fits tightly around tie so as to prevent displacement of the waterstop during concrete placement, or molded plastic water stop of comparable size.
  - b) Orient waterstop perpendicular to tie and symmetrical about center of tie.
  - c) Design ties to prevent rotation or disturbance of center portion of tie during removal of ends and to prevent water leaking along tie.
- b. Through-Bolts:
  - 1) At Contractor's option, may be used as alternate to form snap-tie or form snap-tie with water stop.
  - 2) Tapered minimum 1-inch diameter at smallest end.
  - 3) Plug for Through-Bolt Tie Holes:
    - a) Design and size of plug to allow insertion and compression of plug to form impermeable seal at center of member.
    - b) Manufacturers and Products:
      - (1) Sika Greenstreak, St. Louis, MO; X-Plug.
3. Formwork Release Agents:
  - a. Shall not impair subsequent treatments of concrete surfaces when applied to forms.
  - b. If field mockup is required, use form-release agents accepted on field mockup.
  - c. Ready-to-use water-based material formulated to reduce or eliminate surface imperfections.
  - d. Contain no mineral oil or organic solvents.
    - 1) Manufacturers and Products:
      - a) Master Builders Solutions US, Shakopee, MN; MasterFinish RL 211.
      - b) Euclid Chemical, Cleveland, OH; FORMSHIELD WB.

4. Expansion Joint Filler: See Section 03 15 00, Concrete Joints and Accessories.
5. Other Embedded Items: Unless otherwise specified, in accordance with Provision 2.2.1.5 of ACI 301.
6. Rustications and Reveals: If required in Contract Documents, provide rustication and reveal strips as follows:
  - a. Nonabsorbent, compatible with form surface.
  - b. Of sufficient stiffness to maintain alignment during concrete placement.
  - c. Fully sealed on all sides prohibiting loss of paste or water between the two surfaces.
  - d. Fabricated from same metal as metal form face.
  - e. See Drawings for location, size, and spacing of required rustications and reveals.
7. Chamfer Materials.

C. Performance and Design Requirements:

1. Unless otherwise noted, in accordance with ACI 301, Article 2.2.2 *Performance and Design Requirements*, to provide concrete finishes specified in Section 03 30 00, Cast-in-Place Concrete, and within specified tolerances.
  - a. Earth cuts may be used as forms for vertical or sloping surfaces provided the following is satisfied:
    - 1) Concrete element shall not be visible in finished construction.
    - 2) Contractor solicits and receives Building Official's concurrence that soil conditions do not require formwork.
    - 3) Contractor coordinates interface between concrete element and adjacent construction, and adjudicates conflicts between concrete element and adjacent construction, at no additional cost to Owner.
    - 4) Concrete cover at sides of concrete element shall comply with minimum requirements for concrete cast against earth. Achieve minimum cover by increasing width of concrete element by 1 inch, for each vertical face cast against earth.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Unless otherwise specified, execution shall be in accordance with in accordance with Paragraph 2.3 of ACI 301.
  - 1. Unless otherwise noted, provide bevels on re-entrant corners of concrete.
    - a. Do not provide bevels in re-entrant corner of penetration where appurtenance passing through penetration must fit tight within penetration.
  - 2. Unless otherwise noted, provide bevels on edges of formed concrete joints.
    - a. Do not provide bevels along expansion joints or interior construction joints of slabs.
- B. Form Tolerances:
  - 1. Unless otherwise specified, provide forms in accordance with ACI 117 and ACI 301, and the following tolerances for finishes specified:
    - a. See the Schedule of Concrete Finishes in Section 03 30 00, Cast-in-Place Concrete, for beam, column, and wall types related to required form tolerances.
    - b. Wall Tolerances:
      - 1) Straight Vertical or Horizontal Wall Surface: Flat planes within tolerance specified.
      - 2) Wall Type W-A:
        - a) Plumb within 1/4 inch in 10 feet or within 1 inch from top to bottom for walls over 40 feet high.
        - b) Depressions in Wall Surface: Maximum 5/16 inch when 10-foot straightedge is placed on high points in all directions.
      - 3) Wall Type W-B:
        - a) Plumb within 1/8 inch in 10 feet or within 1/2 inch from top to bottom for walls over 40 feet high.
        - b) Depressions in Wall Surface: Maximum 1/8 inch when 10-foot straightedge is placed on high points in all directions.
      - 4) Thickness: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
      - 5) Form Offset: Between adjacent pieces of formwork, facing material shall not exceed 1/4 inch.

- c. Beams and Columns Tolerances:
  - 1) Exposed Straight Horizontal and Vertical Surfaces: Flat planes within tolerances specified.
  - 2) Lateral Alignment:
    - a) Centerlines shall be within plus or minus 1/2 inch from dimensions shown.
    - b) At intersections, centerlines shall intersect within plus or minus 1/2 inch of dimensions shown.
  - 3) Beam Type B-A:
    - a) Physical Dimensions: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
    - b) Elevations: Within plus or minus 1/2 inch, except where tops of beams become part of finished slab. In this case refer to slab tolerances.
  - 4) Column Type C-A:
    - a) Physical Dimensions: Maximum 1/4 inch minus or 1/2 inch plus from dimension shown.
    - b) Plumb within 1/4 inch in 10 feet in all directions with maximum 1/2 inch out-of-plumb at top with respect to bottom.

### 3.02 CONSTRUCTION AND ERECTION OF FORMWORK

- A. In accordance with Paragraph 2.3.1 of ACI 301.

### 3.03 FORM SURFACE PREPARATION

- A. Prior to coating surface, thoroughly clean form surfaces that will be in contact with concrete or that have been in contact with previously cast concrete, dirt, and other surface contaminants.
- B. Exposed Wood Forms in Contact with Concrete: Apply form release agent as recommended by manufacturer.
- C. Steel Forms: Apply form release agent as soon as they are cleaned to prevent discoloration of concrete from rust.

### 3.04 ERECTION

- A. General: In accordance with ACI 301, unless otherwise specified.
- B. Beveled Edges (Chamfer):
  - 1. Unless otherwise noted, form 3/4-inch bevels at concrete edges.
    - a. Facility (20), Dewatering and Control Building: Size of bevels on top of exterior face of cast-in-place kneewalls shall match those on exterior face of precast panels above.
  - 2. Where beveled edges on existing adjacent structures are other than 3/4 inch, obtain Owner's approval of size prior to placement of beveled edge.
- C. Wall Forms:
  - 1. Do not reuse forms with damaged surfaces.
  - 2. Locate form ties and joints in uninterrupted uniform pattern.
  - 3. Inspect form surfaces prior to installation to ensure conformance with specified tolerances.

### 3.05 FORM REMOVAL

- A. Nonsupporting forms, sides of beams, walls, columns, and similar parts of Work, may be removed after cumulatively curing at not less than 50 degrees F for 24 hours from time of concrete placement if:
  - 1. Concrete is sufficiently hard so as not to sustain damage by form removal operations.
  - 2. Curing and protection operations are maintained.
- B. Elevated Structural Slabs or Beams: In accordance with ACI 318, Chapter 6, and at such time as concrete has reached compressive strength equal to 80 percent of specified 28-day compressive strength as determined by test cylinders.
- C. Form Ties: Remove conical inserts or through bolts and plug holes as specified in Section 03 30 00, Cast-in-Place Concrete.

3.06 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

**END OF SECTION**

**SECTION 03 15 00**  
**CONCRETE JOINTS AND ACCESSORIES**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    ASTM International (ASTM):
    - a.    A36/A36M, Specification for Carbon Structural Steel.
    - b.    A615/A615M, Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
    - c.    A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - d.    A767/A767M, Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
    - e.    C920, Specification for Elastomeric Joint Sealants.
    - f.    D226, Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
    - g.    D227, Specification for Coal-Tar Saturated Organic Felt Used in Roofing and Waterproofing.
    - h.    D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
    - i.    D1056, Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
    - j.    D1171, Standard Guide for Evaluating Nonwoven Fabrics.
    - k.    D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
    - l.    D1752, Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
    - m.    D2240, Standard Test Method for Rubber Property – Durometer Hardness.
  2.    Corps of Engineers (COE): CRD-C-572, Corps of Engineers Specifications for Polyvinylchloride Waterstop.

## 1.02 SUBMITTALS

### A. Action Submittals:

1. Shop Drawings:
  - a. Waterstop: Details of splices, method of securing and supporting waterstop in forms to maintain proper orientation and location during concrete placement.
  - b. Construction Joints and Control Joints: Layout and location for each type. Include joints locations shown on Drawings, additional required joint locations and any proposed alternate locations.
2. Product Data:
  - a. Waterstops.
  - b. Bond breaker.
  - c. Premolded joint fillers.
  - d. Roofing felt.
  - e. Accessories not specified in other sections.
3. Samples: PVC waterstop splice, joint, and fabricated cross of each size, shape, and fitting of waterstop.

### B. Informational Submittals:

1. Certification:
  - a. Manufacturer's application instructions for:
    - 1) Bonding agent.
    - 2) Bond breaker.
2. Manufacturer's written instructions for product shipment, storage, handling, installation/application, and repair for:
  - a. Waterstops.
  - b. Bond breaker.
  - c. Bonding agent.
  - d. Premolded joint fillers.

## 1.03 DELIVERY, STORAGE, AND HANDLING

- A. Acceptance at Site: Verify delivered materials are in accordance with Specifications, regulatory agencies, and Manufacturer's product data sheets prior to unloading and storing onsite.
- B. Storage: Store materials under tarps to protect from oil, dirt, and sunlight or as required by Manufacturer.



## **PART 2      PRODUCTS**

### **2.01      PLASTIC WATERSTOP**

- A. Extruded from elastomeric plastic compound of which basic resin shall be prime virgin polyvinyl chloride (PVC). Compound shall not contain scrapped material, reclaimed material, or pigment.
- B. Specific Gravity: Approximately 1.37.
- C. Shore Durometer Type A Hardness: Approximately 80.
- D. Performance Requirements: COE Specification CRD-C-572.
- E. If Required in Control Joints: 6 inches wide with center bulb and parallel longitudinal ribs or protrusions on each side of strip center, as indicated on Drawings.
- F. Where Required in Construction Joints: Flat ribbed, 6 inches wide with parallel longitudinal ribs or protrusions on each side of strip center. Center bulb is optional.
- G. Corrugated or tapered type waterstops are not acceptable.
- H. Thickness: Constant from bulb edge (or center of waterstop) to outside stop edge.
- I. Minimum Weight per Foot of Waterstop: 1.60 pounds for 3/8 inch by 6 inches.
- J. Factory Fabrications: Use only factory fabrications for intersections, transitions, and changes of direction.
- K. Manufacturers and Products for Center Bulb Type:
  - 1. Use same manufacturers for flat ribbed profile:
    - a. Vinylex Corp., St Louis, MO.; No. RB638H (6 inches by 3/8 inch) and No. RB938H (9 inches by 3/8 inch).
    - b. Greenstreak, St. Louis, MO; Style No. 702, (4 inches by 3/16 inch) and Style 732 (6 inches by 3/8 inch).
    - c. Durajoint, Garrettsville, OH.; Type 3, (4 inches by 3/16 inch) and Type 9 (6 inches by 3/8 inch).
    - d. BoMetals, Carrollton, GA.: No. RCB-4316LB (4 inches by 3/16 inch) and No. RCB-638LB (6 inches by 3/8 inch).
    - e. Dacon Plastics LLC, Jacksonville, TX; No. No. RCB11, (4 inches by 3/16 inch) and No. RCB17 (6 inches by 3/8 inch).

2.02 WIRE LOOPED PLASTIC WATERSTOP

- A. Furnish as alternative to plastic waterstops.
- B. Same material and geometry as plastic waterstops.
- C. Furnish with continuous galvanized wire looping at edge for convenience in positioning and securing stop in place in forms.
- D. Manufacturer and Product: Paul Murphy Plastics, Roseville, MI; “Wire Stop Waterstop”; geometry numbers ACR 6380, ACR 9380, as shown on Paul Murphy Plastics Co. Drawing No. CCP-120-12M.

2.03 HYDROPHILIC WATERSTOP

- A. For use at construction joints only, where new concrete is placed against existing concrete and as shown on Drawings.
- B. Material shall be a nonbentonite hydrophilic rubber compound.
- C. Manufacturers and Products:
  - 1. Greenstreak Plastic Products, St. Louis, MO; Hydrotite CJ-1020-2K with Leakmaster LV-1 adhesive and sealant.
  - 2. Adeka Ultra Seal, JLM Associates, Spearfish, SD; MC-2010M with 3M-2141 adhesive and P-201 sealant.

2.04 INJECTION-TYPE WATERSTOP

- A. Reinjectable waterstop hose system for use where shown on Drawings.
- B. Reinjectable Water Stop Hose:
  - 1. Fabricated of polyvinyl chloride (PVC) compound.
  - 2. Contain discharge openings to allow for disbursement of an injection material into expansion joint.
    - a. Discharge openings designed to be sealed tight during concreting operation to prevent entry of mixing water and cement slurry.
  - 3. Allows free and uniform discharge of injection material over entire length of hose during injection process.
  - 4. Able to be internally cleaned by using water and vacuum pressure.

- C. Injection Material: Hydrophilic or hydrophobic resin grout for use in expansion joints as recommended by reinjectable waterstop hose manufacturer.
- D. Manufacturers and Products:
  - 1. Greenstreak/BBZ, St. Louis, MO.; Fuko Injection Hose System with Multigel 850.
  - 2. Deneef Construction Chemicals, Inc., Houston, TX.; TRIOject Injection Hose System with Hydro Active Grout.

## 2.05 BOND BREAKER

- A. Tape for Joints: Adhesive-backed glazed butyl or polyethylene tape. Same width as joint that will adhere to premolded joint material or concrete surface.
- B. Use bond prevention material as specified in Section 03 30 00, Cast-in-Place Concrete, except where bond breaker tape is specifically called for on Drawings.

## 2.06 PREMOLDED JOINT FILLER

- A. Bituminous Type: ASTM D994 or ASTM D1751.
- B. Sponge Rubber:
  - 1. Neoprene, closed-cell, expanded; ASTM D1056, Type 2C5, with compression deflection, 25 percent deflection (limits), 119 kPa to 168 kPa (17 psi to 24 psi) minimum. Use in joints for potable and nonpotable water containment structures.
  - 2. Manufacturer and Product: Monmouth Rubber and Plastics, Corp, Long Branch, NJ; Durafoam DK5151.

## 2.07 ACCESSORIES

- A. Joint Sealant: Polyurethane as specified in Section 07 92 00, Joint Sealants.
- B. Roofing Felt: ASTM D226, Type II, 30-pound asphalt-saturated or equal weight of ASTM D227 coal-tar saturated felt.
- C. Steel Reinforcement: As specified in Section 03 21 00, Steel Reinforcement.
- D. Nails: Galvanized, as required for securing premolded joint filler.
- E. Ties for PVC Waterstop: "Hog Rings" or grommets for each edge at 12-inch maximum spacing.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Commence concrete placement after joint preparation is complete.
- B. Time Between Concrete Pours: As specified in Section 03 30 00, Cast-in-Place Concrete.

### **3.02 SURFACE PREPARATION**

- A. Construction Joints: Prior to placement of abutting concrete, clean contact surface.
  - 1. Remove laitance and spillage from steel reinforcement and dowels.
  - 2. Roughen surface to minimum of 1/4-inch amplitude:
    - a. Sandblast after concrete has fully cured.
    - b. Water blast after concrete has partially cured.
    - c. Green cut fresh concrete with high-pressure water and hand tools.
  - 3. Perform cleaning so as not to damage waterstop, if one is present.
- B. Contraction Joint and Control Joint:
  - 1. Coat concrete surfaces above and below plastic waterstop with bond breaker.
  - 2. Do not damage or coat waterstop.
- C. Construction Joint with Hydrophilic Waterstop:
  - 1. Follow hydrophilic waterstop manufacturer's written instructions.
  - 2. Clean debris, dirt, dust, and foreign material from concrete surface. Concrete surface must be smooth, clean, and dry. Grind concrete as required.

### **3.03 INSTALLATION OF WATERSTOPS**

- A. General:
  - 1. Continuous waterstop shall be installed in all construction joints in walls and slabs of water holding basins and channels and in walls of belowgrade structures, unless specifically noted otherwise.
  - 2. Join waterstop at intersections to provide continuous seal.
  - 3. Center waterstop on joint.

4. Secure waterstop in correct position. Tie waterstop to steel reinforcement using grommets, "Hog Rings," or tie wire at maximum spacing of 12 inches. Do not displace waterstop during concrete placement.
5. Repair or replace damaged waterstop.
6. Place concrete and vibrate to obtain impervious concrete in vicinity of joints.
7. Joints in Footings and Slabs:
  - a. Ensure that space beneath horizontal waterstop is completely filled with concrete.
  - b. During concrete placement, make visual inspection of waterstop area.
  - c. Limit concrete placement to elevation of waterstop in first pass, vibrate concrete under waterstop, lift ribbed waterstop to confirm full consolidation without voids, then place remaining concrete to full height of slab.

B. Plastic Waterstops:

1. Install in accordance with manufacturer's written instructions.
2. Splice in accordance with waterstop manufacturer's written instructions using Teflon-coated thermostatically controlled heating iron at approximately 380 degrees F.
  - a. Allow at least 10 minutes before new splice is pulled or strained in any way.
  - b. Finished splices shall provide cross section that is dense and free of porosity with tensile strength of not less than 80 percent of unspliced materials.
  - c. Use only factory made waterstop fabrications for all intersections, changes of directions and transitions.
  - d. Field splice permitted only for straight butt welds.
3. Wire looped plastic waterstop may be substituted for plastic waterstop.

C. Hydrophilic Waterstop:

1. Install in accordance with manufacturer's written instructions.
2. Provide minimum of 2-1/2 inches of concrete cover over waterstop. When structure has two layers of steel reinforcement, locate centered between layers of steel or as shown.
3. Apply adhesive to concrete surface and allow to dry for specified time before applying waterstop strip.
4. Lap ends of waterstop strip together at splices and corners and join with sealant.

5. Verify that waterstop is anchored firmly in place before placing concrete. Do not allow vibrator to come into contact with waterstop.
6. Lap hydrophilic waterstop 2 feet minimum with intersecting plastic waterstops.

D. Injection-Type Waterstop:

1. Install reinjectable waterstop hose in accordance with manufacturer's instructions.
2. After concrete has been placed and cured for a minimum of 28 days, inject specified injection material into reinjectable waterstop hose in accordance with manufacturer's instructions.
3. Upon completion of injection process, clean out remaining injection material in hose in accordance with manufacturer's instructions to allow for future injections.

3.04 CONTROL JOINT INSTALLATION

- A. Locate steel reinforcement as shown.
- B. Where required, install waterstop.
- C. Vibrate concrete thoroughly along the joint form to produce a dense, smooth surface. Do not roughen surface.
- D. Install bond breaker to concrete surfaces above and below waterstop.

3.05 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site for installation assistance, inspection, and certification of proper installation for products specified.

3.06 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

**END OF SECTION**

**SECTION 03 21 00  
STEEL REINFORCEMENT**

**PART 1      GENERAL**

**1.01      GENERAL**

- A.    Steel reinforcement shall comply with ACI 301 and as modified in the following.

**1.02      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    American Concrete Institute (ACI):
    - a.    117, Specification for Tolerances for Concrete Construction and Materials.
    - b.    301, Specifications for Structural Concrete.
    - c.    SP-66, Detailing Manual.
  2.    American Welding Society (AWS): D1.4/D1.4M, Structural Welding Code - Reinforcing Steel.
  3.    ASTM International (ASTM):
    - a.    A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
    - b.    A706/A706M, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
    - c.    A767/767M, Standard Specification for Zinc-Coated (Galvanized) Steel bars for Concrete Reinforcement
    - d.    A775/A775M, Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
    - e.    A970/A970M, Standard Specification for Headed Steel Bars for Concrete Reinforcement.
    - f.    A1064/A1064M, Standard Specification for Carbon Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
  4.    Concrete Reinforcing Steel Institute (CRSI):
    - a.    Placing Reinforcing Bars.
    - b.    Manual of Standard Practice.
  5.    International Code Council (ICC): Evaluation Services Report.

### 1.03 SUBMITTALS

#### A. Action Submittals:

1. Shop Drawings prepared in accordance with ACI 301 and ACI SP-66:
  - a. Bending lists.
  - b. Placing drawings.
2. Welded, metallic sleeve splice, and mechanical threaded connection.

#### B. Informational Submittals:

1. Lab test reports for steel reinforcement showing stress-strain curves and ultimate strengths.
2. Mechanical Threaded Connections:
  - a. Current ICC Evaluation Services Report or equivalent code agency report listing findings to include acceptance, special inspection requirements, and restrictions.
  - b. Verification device threads have been tested and meet requirements for thread quality, in accordance with manufacturer's published methods.
  - c. Manufacturer's instructions.
3. Welding Qualification: Prior to welding, submit welder qualifications and nondestructive testing procedures in accordance with Section 05 05 23, Welding.
4. Test results of field testing.

### 1.04 QUALITY ASSURANCE

- #### A. Welder Qualifications: Certified in accordance with AWS D1.4/D1.4M.

### 1.05 DELIVERY, STORAGE, AND HANDLING

- #### A. In accordance with ACI 301 and recommendations of CRSI Placing Reinforcing Bars.

## PART 2 PRODUCTS

### 2.01 MATERIALS

#### A. Reinforcing Bars:

1. Includes stirrups, ties, and spirals.
2. ASTM A615/A615M, Grade 60, where welding is not required.
3. ASTM A706/A706M, Grade 60, for reinforcing to be welded.
4. ASTM A767/767M, Grade 60, for galvanized bars.



B. Mechanical Splices and Connections:

1. Capable of developing in tension or compression.
2. Specific product within the series shall be certified to comply with Type 2 mechanical splice requirements in accordance with ACI 318 and IBC.
3. Shall be configured such that concrete cover over coupler complies with specified minimum cover for steel reinforcement, and maintains position of reinforcement within specified placement tolerances.
4. Manufacturers and Products:
  - a. Erico International Corporation, Solon, OH; nVent LENTON Mechanical Splice System.
  - b. Dayton Superior Corporation, Miamisburg, OH; 100- through 400-Series.

C. Welded Wire Fabric:

1. ASTM A1064, using wire of 75 ksi minimum tensile strength.
2. Furnish flat sheets only, rolled sheets not permitted.

2.02 ACCESSORIES

A. Tie Wire:

1. Black, soft-annealed 16-gauge wire.
2. Nylon-, epoxy-, or plastic-coated wire.

B. Bar Supports and Spacers:

1. Plastic Protected Wire Bar Supports: In compliance with ANSI/CRSI – RB 4.1 Class 1 Reinforcement Supports.
2. Stainless Steel Protected Wire Bar Supports: In compliance with ANSI/CRSI – RB 4.1 Class 2 Reinforcement Supports, except legs shall be made wholly from stainless steel wire.
3. Precast Concrete Bar Supports: In compliance with ANSI/CRSI – RB 4.1 Cementitious (Precast) Reinforcement Supports.
  - a. Precast concrete bar supports shall have equal or greater strength than the surrounding concrete.
  - b. Precast concrete bar supports shall be four square inches minimum, in plan.
  - c. Precast concrete bar supports shall have tie wires.

## **PART 3      EXECUTION**

### **3.01      PREPARATION**

- A. Notify Engineer when reinforcing is ready for inspection and allow sufficient time for inspection prior to placing concrete.
- B. Clean reinforcing bars of loose mill scale, oil, earth, and other contaminants.

### **3.02      PLACING REINFORCING STEEL**

- A. Unless otherwise specified, in accordance with ACI 301.
- B. Accessories:
  - 1. Bar Supports in Contact with Ground: Provide precast concrete block supports.
    - a. Do not use brick, broken concrete masonry units, spalls, rocks, construction debris, or similar material for supporting reinforcing steel.
  - 2. Bar Supports in Contact with Forms: Unless otherwise noted, bar supports shall be plastic protected wire bar supports, stainless steel protected wire bar supports, or precast concrete block bar supports.
    - a. Use stainless steel protected wire bar supports or precast concrete block bar supports at formed surfaces that will receive abrasive blasting, hydro-blasting, or grinding.
  - 3. Bar supports shall have sufficient strength and stiffness to carry loads without failure, displacement, or significant deformation. Space bar supports so minimum concrete cover is maintained for reinforcing between supports, and location of reinforcement remains within tolerance throughout work.
- C. Splices and Laps:
  - 1. Lap Splice Reinforcing: Refer to Structural General Notes on Drawings for additional information.
  - 2. Tie splices with annealed wire as specified in CRSI Standard.
  - 3. Welded Splices: Accomplish by full penetration groove welds and develop a minimum of 125 percent of yield strength of bar.
  - 4. Stagger splices in adjacent bars where indicated.
- D. Splices and Laps:
  - 1. Lap Splice Reinforcing: Refer to Structural General Notes on Drawings for additional information.
  - 2. Tie splices with annealed wire as specified in CRSI Standard.

3. Welded Splices: Accomplish by full penetration groove welds and develop a minimum of 125 percent of yield strength of bar.
4. Stagger splices in adjacent bars where indicated.

E. Mechanical Splices and Connections:

1. Provide mechanical splices and connections where shown on Drawings.
2. Install assembly in accordance with manufacturer's written instructions and in accordance with ICC Evaluation Services Report or equivalent code agency report.
3. Maintain minimum edge distance and concrete cover.

F. Reinforcement Around Openings: On each side and above and below pipe or opening, place an equivalent area of steel bars to replace steel bars cut for opening. Extend steel reinforcing a standard lap length beyond opening at each end.

G. Welding Reinforcement:

1. Only ASTM A706/A706M bars may be welded.
2. Do not perform welding until welder qualifications are approved.

H. Straightening and Rebending: Field bending of steel reinforcement bars is not permitted.

I. Unless permitted by Engineer, do not cut reinforcing bars in field.

### 3.03 WELDED WIRE FABRIC INSTALLATION

- A. Use only where specifically shown.
- B. Extend fabric to within 2 inches of edges of slab and lap splices at least 1-1/2 courses of fabric or minimum 8 inches.
- C. Tie laps and splices securely at ends and at least every 24 inches with tie wire.
- D. Place welded wire fabric on concrete blocks and rigidly support equal to that provided for reinforced bars. Do not use broken concrete, brick, or stone.
- E. Do not use fabric that has been rolled. Install flat sheets only.

3.04 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

**END OF SECTION**

**SECTION 03 24 00  
FIBROUS REINFORCING**

**PART 1 GENERAL**

**1.01 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
  - 1. ASTM International (ASTM):
    - a. C78, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
    - b. C1116, Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
    - c. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.

**1.02 DEFINITIONS**

- A. Aspect Ratio: The ratio of length to diameter of the fiber.
- B. Fibrillated Fibers: Fibers in bundles that, when added to concrete during mixing, separate into uniformly distributed angular fibrils (fiber strands) which act as secondary concrete reinforcement.
- C. Micro-Fibers: Shorter length, low dose, typically 0.1 percent by volume fibers designed to control plastic shrinkage cracking.

**1.03 SUBMITTALS**

- A. Action Submittals: Product data for fibrillated fibers.
- B. Informational Submittals:
  - 1. Manufacturer's written instructions for mixing and batching of fibrillated fibers.
  - 2. Fiber manufacturer's Certificate of Compliance.
  - 3. Certificate of Compliance from concrete supplier as to type, brand name, and amount of fibers added to mix.
  - 4. Fiber manufacturer's certification of registration as proof of ISO 9002 Fiber Manufacturing Facility Certification.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

#### **A. Micro-Fibers:**

1. 100 percent virgin polypropylene self-fibrillating fibers.
2. Multidesign gradation.
3. Fibrillated bundles to allow uniform distributed angular fibrils (fiber strands) when mixed into concrete.
4. Specific Gravity: 0.91 minimum.
5. Reprocessed olefin materials are not allowed.
6. Type III fibers conforming to ASTM C1116, Part 4.1.3.
7. Fiber Length: 0.50 inch to 1.0 inch.
8. Manufacturers and Products:
  - a. Euclid Chemical Company, Cleveland OH; Fiberstrand F.
  - b. Propex Concrete Systems Corporation, Chattanooga, TN; Fibermesh 300.

#### **B. Concrete: Components shall conform to Section 03 30 00, Cast-in-Place Concrete.**

### **2.02 CONCRETE MIX DESIGN AND CONCRETE MIXING**

- A. In accordance with Section 03 30 00, Cast-in-Place Concrete.
- B. Add 1.5 pounds minimum per cubic yard at the time concrete is batched.
- C. Mix fibers into concrete in accordance with fiber manufacturer's instructions.

## **PART 3 EXECUTION**

### **3.01 PLACING, PROTECTING, CURING, AND FINISHING**

- A. In accordance with Section 03 30 00, Cast-in-Place Concrete.

### **3.02 FIELD QUALITY CONTROL**

- A. Test as specified in Section 03 30 00, Cast-in-Place Concrete.
- B. Test minimum of two additional beam Samples for each 25 cubic yards or any portion thereof used on the Project.

3.03 MANUFACTURER'S SERVICE

- A. Provide the services of a technical representative to instruct the concrete supplier in proper batching and mixing of materials.

**END OF SECTION**





**SECTION 03 30 00  
CAST-IN-PLACE CONCRETE**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards that may be referenced in this section:
1.    American Concrete Institute (ACI):
    - a.    301-16, Specifications for Structural Concrete.
    - b.    305.1, Specification for Hot Weather Concreting.
    - c.    306.1, Standard Specification for Cold Weather Concreting.
    - d.    350.1, Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures.
    - e.    CP-1, Technical Workbook for ACI Certification of Concrete Field Testing Technician – Grade 1.
  2.    ASTM International (ASTM):
    - a.    C1260, Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
    - b.    C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
    - c.    C1567, Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
    - d.    C1582/C1582M, Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete.
    - e.    C1583/C1583M, Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).
    - f.    D4580, Standard Practice for Measuring Delaminations in Concrete Bridge Decks by Sounding.
    - g.    D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
    - h.    E329, Standard Specification for Agencies Engaged in Construction Inspection, Special Inspection, or Testing Materials Used in Construction.
    - i.    E1155, Standard Test Method for Determining  $F_F$  Floor Flatness and  $F_L$  Floor Levelness Numbers.
  3.    International Concrete Repair Institute (ICRI):
    - a.    PC1-10, Concrete Surface Profile Chip Set.
  4.    National Ready Mixed Concrete Association (NRMCA).

## 1.02 DEFINITIONS

- A. Cold Weather: When ambient temperature is below 40 degrees F or is approaching 40 degrees F and falling.
- B. Contractor's Licensed Design Engineer: Individual representing Contractor who is licensed to practice engineering as defined by statutory requirements of professional licensing laws in state or jurisdiction in which Project is to be constructed.
- C. Defective Area:
  - 1. Surface defects that include honeycomb, rock pockets, indentations, and surface voids greater than 3/16-inch deep, surface voids greater than 3/4 inch in diameter, cracks in liquid containment structures and below grade habitable spaces that are 0.005-inch wide and wider, and cracks in other structures with visible leakage or that are 0.010-inch wide and wider, spalls, chips, embedded debris, sand streaks, mortar leakage from form joints, deviations in formed surface that exceed specified tolerances and include but are not limited to fins, form pop-outs, and other projections.
  - 2. At exposed concrete, defective areas also include texture irregularities, stains, and other color variations that cannot be removed by cleaning.
  - 3. Cold joints.
- D. Exposed Concrete: Concrete surface that can be seen inside or outside of structure regardless of whether concrete is above water, dry at all times, or can be seen when structure is drained. Surfaces must be considered exposed concrete, even if covered by paint, sealers, or similar applications.
- E. Flat and Elongated Particles of Aggregates: Those particles having a ratio of length to thickness greater than a 5 to 1.
- F. Hot Weather: As defined in ACI 305.1.
- G. Hydraulic Structure: Liquid containment structure.
- H. Mass Concrete:
  - 1. Concrete sections with a minimum specified dimension that is equal to or greater than 2 feet 6 inches.
  - 2. Concrete sections with a minimum specified dimension that is equal to or greater than 2 feet 0 inches, and either of the following:
    - a. Concrete mixture includes an accelerating admixture.
  - 3. Concrete mixture contains a larger volume of portland cement or slag cement, than what was used in the thermal control plan.
- I. New Concrete: Less than 60 days old.

## 1.03 SUBMITTALS

### A. Action Submittals:

#### 1. Mix Designs:

- a. Contain proportions of materials and admixtures to be used on Project, signed by mix designer.
- b. Documentation of average strength for each proposed mix design in accordance with ACI 301.
- c. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, for the following:
  - 1) Portland cement.
  - 2) Fly ash.
  - 3) Slag cement.
  - 4) Silica Fume.
  - 5) Aggregates, including specified class designation for coarse aggregate.
  - 6) Admixtures.
  - 7) Concrete producer has verified compatibility of constituent materials in design mix.
- d. Test Reports:
  - 1) Cement: Chemical analysis report.
  - 2) Supplementary Cementitious Materials: Chemical analysis report and report of other specified test analyses.
  - 3) Aggregates:
    - a) Deleterious substances in fine aggregate per ASTM C33/C33M, Table 2.
    - b) Deleterious substances in coarse aggregate per ASTM C33/C33M, Table 4.
  - 4) Water-soluble chloride-ion content in hardened concrete: One of the following:
    - a) Test report in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.
    - b) Calculation of water-soluble chloride content based on certified chloride content of each constituent material and proportion of constituent material in concrete mixture.
  - 5) Resistance to alkali silica reaction: Supporting information for one of the options for mitigating alkali silica reaction listed in Article Concrete Mix Design. Include documentation of test results per applicable standards.

2. Product Data:
  - a. Admixtures:
    - 1) Manufacturer's catalog cut sheets and product data sheets for each admixture used in proposed mix designs.
    - 2) Coloring Admixture: Product data including application rate and color chart, if coloring admixture is required.
  - b. Specified ancillary materials.
3. Detailed plan for curing and protection of concrete placed and cured in cold weather. Details shall include, but not be limited to, the following:
  - a. Procedures for protecting subgrade from frost and accumulation of ice or snow on reinforcement, other metallic embeds, and forms prior to placement.
  - b. Procedures for measuring and recording temperatures of reinforcement and other embedded items prior to concrete placement.
  - c. Methods for temperature protection during placement.
  - d. Types of covering, insulation, housing, or heating to be provided.
  - e. Curing methods to be used during and following protection period.
  - f. Use of strength accelerating admixtures.
  - g. Methods for verification of in-place strength.
  - h. Procedures for measuring and recording concrete temperatures.
  - i. Procedures for preventing drying during dry, windy conditions.
4. Detailed plan for hot weather placements including curing and protection for concrete placed in ambient temperatures over 80 degrees F. Plan shall include, but not be limited to, the following:
  - a. Procedures for measuring, and recording temperatures of reinforcement and other embedded items prior to concrete placement.
  - b. Use of retarding admixture.
  - c. Methods for controlling temperature of reinforcement and other embedded items and concrete materials before and during placement.
  - d. Types of shading and wind protection to be provided.
  - e. Curing methods, including use of evaporation retardant.
  - f. Procedures for measuring and recording concrete temperatures.
  - g. Procedures for preventing drying during dry, windy conditions.
5. Thermal Control Plan:
  - a. Required for mass concrete.
  - b. In accordance with Article 8.14 of ACI 301.

B. Informational Submittals:

1. Preinstallation Conference minutes.
2. Manufacturer's application instructions for bonding agent and bond breaker.
3. Manufacturer's Certificate of Compliance to specified standards:
  - a. Bonding agent.
  - b. Bond breaker.
4. Statement of Qualification:
  - a. Batch Plant: Certification as specified herein.
  - b. Mix designer.
  - c. Installer.
  - d. Testing agency.
5. Field test reports.
6. Recorded temperature data from concrete placement where specified.
7. Concrete Delivery Tickets:
  - a. For each batch of concrete before unloading at Site.
  - b. In accordance with ASTM C94/C94M, including requirements 14.2.1. through 14.2.10.
  - c. Indicate amount of mixing water withheld and maximum amount that may be permitted to be added at Site.

1.04 QUALITY ASSURANCE

A. Concrete construction shall conform to requirements of ACI 117 and ACI 301, except as modified herein.

B. Qualifications:

1. Batch Plant: NRMCA Program for Certification of Ready-Mixed Concrete Production Facilities or approved equivalent program.
2. Mix Designer: Person responsible for developing concrete mixture proportions certified as NRMCA Concrete Technologist Level 2 or DOT certified mix designer in jurisdiction of the Work. Requirement may be waived if individual is Contractor's Licensed Design Engineer.
3. Flatwork Finisher: Unless otherwise permitted, at least one person on finishing crew shall be certified as an ACI Flatwork Finisher.
4. Testing Agency: Unless otherwise permitted, an independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
  - a. Where field testing is required of Contractor, personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

- b. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
5. Thermal control plan: Signed and sealed by a Professional Engineer registered in the state of the Project.

C. Preinstallation Conference:

1. Required Meeting Attendees:
  - a. Contractor, including pumping, placing and finishing, and curing subcontractors.
  - b. Ready-mix producer.
  - c. Admixture representative.
  - d. Testing and sampling personnel.
  - e. Owner and/or Owner's designee.
  - f. Steel Reinforcement Installer.
2. Schedule and conduct prior to incorporation of respective products into Project. Notify Owner of location and time.
3. Agenda shall include:
  - a. Admixture types, dosage, performance, and redosing at Site.
  - b. Mix designs, test of mixes, and Submittals.
  - c. Placement methods, techniques, equipment, consolidation, and form pressures.
  - d. Slump and placement time to maintain slump.
  - e. Finish, curing, and water retention.
  - f. Steel reinforcement details.
  - g. Thermal control plan.
  - h. Protection procedures for weather conditions.
  - i. Other specified requirements requiring coordination.
4. Conference minutes as specified in Section 01 31 19, Project Meetings.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

A. Cementitious Materials:

1. Cement:
  - a. Portland Cement: Unless otherwise specified, conform to requirements of ASTM C150/C150M.

- b. Blended Hydraulic Cement:
    - 1) Unless otherwise specified, excluding Type IS (greater than 70), conforming to ASTM C595/C595M, and having (MS) designation.
    - 2) Portland cement used in blended hydraulic cement, conform to requirements of ASTM C150/C150M.
  - c. Furnish from one source.
  - 2. Supplementary Cementitious Materials (SCM):
    - a. Fly Ash (Pozzolan): Class F and Class C fly ash in accordance with ASTM C618, except as modified herein:
    - b. Slag Cement: In accordance with ASTM C989, Grade 100 or Grade 120.
- B. Aggregates: Unless otherwise permitted, furnish from one source for each aggregate type used in a mix design.
- 1. Aggregates:
    - a. In accordance with ACI 301, except as modified herein.
    - b. Free of materials and aggregate types causing popouts, discoloration, staining, or other defects on surface of concrete.
    - c. Aggregates that are susceptible to alkali-carbonate reactions shall not be used.
    - d. Resistance to alkali silica reaction: See Article, Concrete Mix Design.
  - 2. Fine aggregates:
    - a. In accordance with ACI 301, except as modified herein.
    - b. In the event manufactured sand is included in the mix design, the material must be from the same source as the coarse aggregate.
    - c. Limit deleterious substances in accordance with ASTM C33/C33M, Table 2 and as follows:
      - 1) Limit material finer than 75- $\mu$ m (No. 200) sieve to 5 percent mass of total sample.
      - 2) Limit coal and lignite to 0.5 percent.
  - 3. Coarse Aggregate:
    - a. Crushed gravels, crushed stone, or combination of these materials containing no more than 15 percent flat or elongated particles as determined by ASTM D4791.
    - b. Class designation in accordance with ASTM C33, Table 3: 4S unless otherwise specified.
    - c. Limit deleterious substances in accordance with ASTM C33/C33M, Table 4 for specified class designation.

- C. Admixtures: Unless otherwise permitted, furnish from one manufacturer.
1. Characteristics:
    - a. Compatible with other constituents in mix.
    - b. Contain at most, only trace amount chlorides in solution.
    - c. Furnish type of admixture as recommended by manufacturer for anticipated temperature ranges.
  2. Air-Entraining Admixture: ASTM C260/C260M.
  3. Water-Reducing Admixture: ASTM C494/C494M, Type A or Type D.
  4. Retarding Admixture: ASTM C494/C494M, Type B.
  5. Accelerating Admixture: ASTM C494/C494M, Type C.
  6. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F or Type G.
  7. Plasticizing Admixture: ASTM C1017/C1017M, Type I or Type II.
  8. Corrosion Inhibiting Admixtures: ASTM C1582/C1582M.
  9. Coloring Admixture: ASTM C979/C979M, inert, synthetic mineral or metaloxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
    - a. Color: As selected by Architect from manufacturer's full range.
  10. Do not use calcium chloride as an admixture.
  11. Admixtures with no standard, ASTM or other, designation may be used where permitted.
- D. Water and Ice: Mixing water for concrete and water used to make ice shall be potable water, unless alternative sources of water are permitted.
1. Water from alternative sources shall comply with requirements of ASTM C1602/C1602M, and concentration of chemicals in combined mixing water shall be less than:
    - a. Chloride Content: 500 ppm.
    - b. Sulfate Content as  $\text{SO}_4$ : 3,000 ppm.
    - c. Alkalis as  $(\text{Na}_2\text{O} + 0.658 \text{ K}_2\text{O})$ : 600 ppm.
    - d. Total Solids by Mass: Less than 50,000 ppm.

## 2.02 ANCILLARY MATERIALS

- A. Bonding Agent: Unless otherwise specified, in accordance with the following:
1. ASTM C881/C881M, Type V.
  2. Two-component, moisture insensitive, 100 percent solids epoxy.
  3. Consult manufacturer for surface finish, pot life, set time, vertical or horizontal application, and forming restrictions.



4. Manufacturers and Products:
  - a. Master Builders Solutions US, Shakopee, MN; Concreive Standard LVI.
  - b. Euclid Chemical Co., Cleveland, OH; Euco # 352 Epoxy System LV.
  - c. Prime Resins, Conyers, GA; Prime Bond 3000 to 3900 Series.
  - d. Sika Chemical Corp., Lyndhurst, NJ; Sikadur 32 Hi-Mod.

B. Bond Breaker:

1. Nonstaining type, providing positive bond prevention.
2. Typical Unless Otherwise Specified, Manufacturers and Products:
  - a. Dayton Superior Corporation, Kansas City, KS; EDOCO Clean Lift Bond Breaker.
  - b. Nox-Crete Products Group, Omaha, NE; Silcoseal Select.
3. When Required provide visqueen plastic sheeting.
  - a. Minimum Thickness: 10 mils.

C. Repair Material:

1. In accordance with requirements of Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces.
2. In accordance with requirements of Section 03 01 33, Repair of Horizontal Concrete Surfaces.

D. Crack Repair: In accordance with requirements of Section 03 64 23, Crack Repair Epoxy Injection Grouting.

2.03 CONCRETE MIX DESIGN

A. General:

1. See Supplement at the end of this section for mix design requirements for each class of concrete used on Project.
2. Prepare design mixtures for each type and strength of concrete, selecting and proportioning ingredients in accordance with requirements of ACI 301, unless otherwise specified.
3. Selection of constituent materials and products in mix design are optional, unless specified otherwise.
4. Unless otherwise permitted, use water-reducing admixture or water-reducing admixture and high-range, water-reducing admixture, or plasticizing admixture.

5. Unless otherwise specified, desired fresh properties of concrete shall be determined by Contractor, and coordinated with concrete producer. Fresh properties of concrete shall remain stable to satisfaction of Contractor, for duration of placement and consolidation, and shall remain in conformance with requirements of Contract Documents.
6. Contractor is encouraged to consider using environmentally sustainable concrete mix design technologies such as use of supplementary cementitious materials, aggregate packing, and self-consolidating concrete.
7. Color Pigment: Where required, add color pigment to concrete mixture according to manufacturer's written instructions.

B. Potential alkali-aggregate reactivity of concrete:

1. Do not use aggregates known to be susceptible to alkali-carbonate reaction (ACR).
2. Unless otherwise specified, or unless members are assigned to Exposure Class W0, use one of the three following options for qualifying concrete mixtures to reduce the potential of alkali-silica reaction.

Option (c) shall not be used with natural pozzolan or fly ash that has a CaO content greater than 18 percent, or for aggregate with expansion at 1 year greater than or equal to 0.24 percent when tested in accordance with ASTM C1293. Fly ash with an alkali content greater than 4.0 percent shall not be used in option (b) or (c).

  - a. For each aggregate used in concrete, the expansion result determined in accordance with ASTM C1293 shall not exceed 0.04 percent at 1 year.
  - b. For each aggregate used in concrete, the expansion result of the aggregate and cementitious materials combination determined in accordance with ASTM C1567 shall not exceed 0.10 percent at an age of 16 days. Submit supporting data for each aggregate showing expansion in excess of 0.10 percent at 16 days when tested in accordance with ASTM C1260.
  - c. Alkali content in concrete (LBA), excluding that from supplementary cementitious materials and the pozzolans and slags in blended cements, shall not exceed 4 lb/yd<sup>3</sup> for aggregates with expansions more than or equal to 0.04 percent and less than 0.12 percent or 3 lb/yd<sup>3</sup> for aggregates with expansions greater than or equal to 0.12 percent and less than 0.24 percent. Reactivity shall be determined by testing in accordance with ASTM C1293. Alkali content shall be calculated as follows:
    - 1) 
$$LBA = (\text{cement content, lb/yd}^3) \times (\text{equivalent alkali content of portland cement in percent}/100 \text{ percent})$$

C. Proportions:

1. Design mix to meet aesthetic, durability, and strength requirements.
2. Where fly ash is included in mix, minimum fly ash content shall be a minimum of 15 percent of weight of total cementitious materials.

D. Slump:

1. Unless otherwise specified, and prior to submitting mix design, select a target slump at the point of delivery for concrete mixtures used for Work. Selected target slump shall not exceed 9 inches. Concrete shall not show visible signs of segregation. The target slump indicated on the submittal shall be used as the basis for acceptance during the project. Determine the slump by ASTM C143/C143M.
2. Slump tolerance shall meet requirements of ACI 117.

E. Self-Consolidating Concrete:

1. Unless otherwise specified, select a target slump flow at the point of delivery for self-consolidating concrete mixtures.
2. Selected target slump flow shall not exceed 30 inches.
3. Concrete shall not show visible signs of segregation.
4. The target slump flow value indicated on the submittal shall be used as the basis for acceptance during the Project.
5. Determine slump flow in accordance with ASTM C1611/C1611M.
6. Slump flow tolerances shall be in accordance with ASTM C94/C94M.

F. Size of Coarse Aggregate:

1. Unless otherwise specified, nominal maximum size of coarse aggregate shall not exceed:
  - a. Three-fourths of the minimum clear spacing between reinforcement.
  - b. One-fifth of the narrowest dimension between sides of forms, and
2. One-third of the thickness of slabs or toppings.

G. Combined Aggregate Gradation:

1. Combined Gradation Limits: Fine aggregate shall be in range of 36 percent to 40 percent of total aggregate weight.

## 2.04 TEMPERATURE LIMITS

- A. Maintain concrete temperature below 95 degrees F at time of placement, or furnish test data or other proof that admixtures and mix ingredients do not produce flash set plastic shrinkage, or cracking as a result of heat of hydration. Cool ingredients before mixing to maintain fresh concrete temperatures as specified or less.
- B. For mass concrete: Provide documentation that maximum concrete temperature in structure will not exceed 160 degrees Fahrenheit, and maximum temperature differential between center of section and external surfaces of concrete will not exceed 35 degrees Fahrenheit.

## 2.05 SOURCE QUALITY CONTROL

- A. Source Quality Control Inspection: Engineer shall have access to and have right to inspect batch plants, cement mills, and supply facilities of suppliers, manufacturers, and Subcontractors, providing products included in this section.

# **PART 3 EXECUTION**

## 3.01 PREPARATION

- A. Preparation: Meet requirements ACI 301, except as modified herein.
  - 1. Where vapor retarder or barrier is required, coordinate subgrade preparation with requirements in Division 7, Thermal and Moisture Protection of Specifications.
  - 2. Reinforcement: Secure in position before placing concrete.
- B. Inspection: Notify Owner and Special Inspector at least 1 full working day in advance before starting to place concrete.
- C. Mass Concrete :
  - 1. Strength measurement shall be representative of in-place concrete within 2 inches of concrete surface.
  - 2. Concrete strength shall be verified through correlation of concrete temperature and compressive strengths established by cylinder compressive tests and in accordance with ASTM C1074.

3. Unless otherwise specified, control concrete temperatures to within specified limits from time concrete is placed until time internal temperature has cooled from its maximum, such that difference between average daily ambient and maximum internal concrete temperature at time of protection removal, is less than specified temperature difference limit.
4. Unless otherwise specified, place one temperature sensor at center of mass of placement and one temperature sensor at a depth 2 inches from center of nearest exterior surface. Place additional sensor at each location to serve as a backup in event that other temperature sensor fails. In addition, provide temperature sensor in shaded location for monitoring ambient onsite temperature.
  - a. Unless otherwise specified, monitor temperatures hourly using electronic sensors capable of measuring temperature from 32 degrees F to 212 degrees F to an accuracy of 2 degrees F.
  - b. Ensure temperature sensors are operational before placing concrete.
  - c. Unless otherwise specified, provide data from sensors to Engineer on a daily basis, until requirements are met.
  - d. Compare temperatures and temperature differences with maximum limits specified in Article Temperature Limits every 12 hours, unless otherwise permitted. If either exceeds specified limits, take immediate action as described in accepted thermal control plan to remedy situation. Do not place additional mass concrete until cause of excessive temperature or temperature difference has been identified and corrections are accepted.

### 3.02 CONCRETE BONDING

- A. Construction Joints in New Concrete Members: Prepare surface of construction joint as specified in Section 03 15 00, Concrete Joints and Accessories.
- B. Construction Joints at Existing Concrete:
  1. Thoroughly clean and mechanically roughen existing concrete surfaces to a roughness profile range between CSP 7 to CSP 9 when verified by comparison to PC1-10.
  2. Saturate surface with water for 24 hours prior to placing new concrete.

### 3.03 PLACEMENT OF CONCRETE:

- A. Unless otherwise specified, in accordance with ACI 301.
- B. Placement frequency must be such that lift lines will not be visible in exposed concrete finishes.

- C. Retempering: Not permitted for concrete where cement has partially hydrated.
- D. Pumping of Concrete: Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during pumping, for adequate redundancy to ensure completion of concrete placement without cold joints in case of primary placing equipment breakdown.
- E. Joints in Footings and Slabs:
  - 1. Ensure space beneath plastic waterstop completely fills with concrete.
  - 2. During concrete placement, make visual inspection of entire waterstop area.
  - 3. Limit concrete placement to elevation of waterstop in first pass, vibrate concrete under waterstop, lift waterstop to confirm full consolidation without voids, and place remaining concrete to full height of slab.
  - 4. Apply procedure to full length of waterstop.
- F. Unless otherwise specified, trowel and round off top exposed edges of walls with 1/4-inch radius steel edging tool.
  - 1. Facility (20) Dewatering and Control Building: Provide chamfer along top exterior face of perimeter kneewall. Chamfer shall match size and configuration of chamfers used in precast wall panels.
- G. Maximum Size of Concrete Placements:
  - 1. Locate expansion, control, and contraction joints where shown on Drawings.
  - 2. Construction Joints: Unless otherwise shown or permitted, locate construction joints as follows:
    - a. Locate construction joints as shown on Drawings or where approved in joint location submittal required in Section 03 15 00, Concrete Joints and Accessories.
    - b. Uniformly space vertical construction joints within straight sections of walls and slabs, avoiding penetrations.
    - c. Facility (20) Dewatering and Control Building: Align construction joints in perimeter kneewall with joints between precast wall panels above the kneewall.

### 3.04 FIBER REINFORCED CONCRETE

- A. Location:
  - 1. Where fiber reinforced concrete topping is required.
  - 2. Where fiber reinforced concrete fill is required.
  - 3. See Drawings.

B. Surface Preparation:

1. For topping slabs and fiber reinforced concrete fill not dowelled directly to substrate, prepare top of substrate by high-pressure water blasting machines capable of removing concrete surface.
2. High-pressure, water-blasting machines with 8,000 psi minimum pressure capable of rapidly removing surface of sound concrete.
3. Remove slab surface material to create a roughness profile range between CSP 6 to CSP 8 when verified by comparison to PC1-10.
4. Collect spent water and debris and dispose in location and manner acceptable to Owner.
5. Square edges of removed concrete to avoid tapered shoulders.
6. Do not use power-driven jackhammers, scabblers, or scarifiers.
7. Saturate existing concrete slab for 24 hours prior to fiber reinforced concrete placement.
  - a. Surface shall be damp but free of standing water at time of application of fiber reinforced concrete.

C. Fiber Reinforced Concrete Application:

1. Hand scrub thick creamy cement-water slurry coating into existing concrete surfaces, just ahead of placement of fiber reinforced concrete.
2. Place fiber reinforced concrete before slurry coating begins to dry.
3. Work fiber reinforced concrete into place using conventional placing tools.
4. Place fiber reinforced concrete within specified surface tolerances.

D. Finish: Provide slab finish as described in Article Concrete Slab Finishes.

3.05 CURING

- A. Cure concrete as specified in Section 03 39 00, Concrete Curing.

3.06 REPAIRING CONCRETE

A. General:

1. Inject cracks that leak with crack repair epoxy as specified in Section 03 64 23, Crack Repair Epoxy Injection Grouting.
2. Repair defective areas of concrete.
3. Repair horizontal concrete surfaces in accordance with Section 03 01 33, Repair of Horizontal Concrete Surfaces.
4. Repair vertical and overhead concrete surfaces in accordance with Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces.

B. Tie Holes:

1. Unless otherwise specified, fill with specified repair material.
  - a. Prepare substrate and mix, place, and cure repair material per manufacturer's written recommendations.
  - b. Tie holes on exposed surfaces of interior concrete walls and for Facility (20) Dewatering and Control Building, tie holes on exterior surface of perimeter kneewall below EL 16.00.
    - 1) Demonstrate that patch of tie holes matches texture and color of adjacent surface prior to proceeding with production patches on mockup panels.
    - 2) Clean and dampen tie holes before applying mortar. Do not use separate bonding agent.
    - 3) Fill with site-mixed portland-cement repair mortar per ACI 301.
    - 4) Moist cure repair mortar.

C. Alternate Form Ties, Through-Bolts:

1. Mechanically roughen entire interior surface of through hole.
2. Apply bonding agent to roughened surface and drive elastic vinyl plug to half depth.
3. Dry pack entire hole from both sides of plug with nonshrink grout, as specified in Section 03 62 00, Nonshrink Grouting.
4. Use only enough water to dry pack grout.
5. Dry pack while bonding agent is still tacky.
6. If bonding agent has dried, remove bonding agent by mechanical means and reapply new coat of bonding agent.
7. Compact grout using steel hammer and steel tool to drive grout to high density.
8. Moist cure grout.
  - a. Facility (20) Dewatering and Control Building:
  - b. Tie Holes on Exterior Surface of Perimeter Kneewall Below EL 16.00.
  - c. Tie Holes Exposed Surfaces of Interior Concrete Walls.
    - 1) Demonstrate that patch of tie holes matches texture and color of adjacent surface prior to proceeding with production patches.
    - 2) Fill hole with nonshrink grout as described in paragraph above, except hold materials back 1 inch from concrete surfaces.
    - 3) Allow nonshrink grout to fully cure.
    - 4) Remove dried bonding agent by mechanical means.



- 5) Clean and dampen remaining depressions before applying mortar.
- 6) Do not use separate bonding agent on existing surfaces in remaining depression.
- 7) Fill with site-mixed portland-cement repair mortar per ACI 301.
- 8) Moist cure repair mortar.

D. Exposed Metal Objects:

1. Remove metal objects not intended to be exposed in as-built condition of structure including wire, nails, and bolts, by chipping back concrete to depth of 1 inch and then cutting or removing metal object.
2. Repair area of chipped-out concrete as specified for defective areas.

E. Blockouts at Pipes or Other Penetrations: Where shown install in accordance with requirements of Drawings.

3.07 FORMED SURFACE FINISHES

A. Trowel and round off top exposed edges of walls with 1/4-inch radius steel edging tool.

B. Concrete Wall Finishes:

1. Type W-1 (Ordinary Wall Finish):
  - a. Patch tie holes.
  - b. Remove projections.
  - c. Repair defective areas.
  - d. Inject cracks in accordance with requirements of Section 03 64 23, Crack Repair Epoxy Injection Grouting.
2. Type W-2 (Smooth Wall Finish):
  - a. Patch tie holes.
  - b. Remove projections.
  - c. Repair defective areas to provide smooth uniform appearance.
  - d. Inject cracks in accordance with requirements of Section 03 64 23, Crack Repair Epoxy Injection Grouting.
3. Type W-5 (Finish for Painting):
  - a. In accordance with requirements for Type W-2 except as follows: Leave surface ready for painting as specified in Section 09 90 00, Painting and Coating.

C. Beam and Column Finishes:

1. Type B-1: Match wall Type W-1.
2. Type B-2: Match wall Type W-2.
3. Type B-3:
  - a. Repair rock pockets.
  - b. Fill air voids.
  - c. Match wall Type W-5.
4. Type C-1: Match wall Type W-1.
5. Type C-2: Match wall Type W-2.
6. Type C-3:
  - a. Repair rock pockets.
  - b. Fill air voids.
  - c. Match wall Type W-5.

3.08 CONCRETE SLAB FINISHES

A. General:

1. Use manual screeds, vibrating screeds, or roller compacting screeds to place concrete level and smooth.
2. Do not use “jitterbugs” or other special tools designed for purpose of forcing coarse aggregate away from surface and allowing layer of mortar, which will be weak and cause surface cracks or delamination, to accumulate.
3. Finish slab in accordance with specified slab finish.
4. Do not dust surfaces with dry materials nor add water to surfaces.
5. Cure concrete as specified in Section 03 39 00, Concrete Curing.

B. Type S-1 (Steel Troweled Finish):

1. Finish by screeding and floating with straightedges to bring surfaces to required finish elevation.
2. Wood float to true, even plane with no coarse aggregate visible.
3. Use sufficient pressure on wood floats to bring moisture to surface.
4. After surface moisture has disappeared, hand steel trowel concrete to produce smooth, smooth dense surface, free from trowel marks.
5. Provide light steel-troweled finish (two trowelings) at air-entrained slabs. Provide hard steel-troweled finish (ringing sound from the trowel) for nonair-entrained slabs.

6. Do not use dry cement or additional water during troweling, nor will excessive troweling be permitted.
  7. Power Finishing:
    - a. Approved power machine may be used in lieu of or in addition to hand finishing in accordance with directions of machine manufacturer.
    - b. Do not use power machine when concrete has not attained necessary set to allow finishing without introducing high and low spots in slab.
    - c. Do first steel troweling for slab S-1 finish by hand.
- C. Type S-2 (Wood Float Finish):
1. Finish slab to receive fill and mortar setting bed by screeding with straightedges to bring surface to required finish plane.
  2. Wood float finish to compact and seal surface.
  3. Remove laitance and leave surface clean.
  4. Coordinate with other finish procedures.
- D. Type S-3 (Underside Elevated Slab Finish): When forming is removed, grind off projections on underside of slab and repair defective areas, including small shallow air pockets where schedule of concrete finishes requires: Prepare surfaces to match Type W-5 (Finish for Painting).
- E. Type S-5 (Broomed Finish):
1. Finish as specified for Type S-1 floor finish, except use only a light-steel troweled finish, and then finish surface by drawing fine-hair broom lightly across surface.
  2. Broom in same direction and parallel to expansion joints, or, in case of inclined slabs, perpendicular to slope, except for round roof slab, broom surface in radial direction.
- F. Type S-6 (Sidewalk Finish):
1. Slope walks down 1/4 inch per foot away from structures, unless otherwise shown.
  2. Strike off surface by means of strike board and float with wood or cork float to true plane, then flat steel trowel before brooming.
  3. Broom surface at right angles to direction of traffic or as shown.
  4. Lay out sidewalk surfaces in blocks, as shown or as directed by Engineer, with grooving tool.

G. Concrete Curbs:

1. Float top surface of curb smooth, and finish all discontinuous edges with steel edger.
2. After concrete has taken its initial set, remove front form and give exposed vertical surface an ordinary wall finish, Type W-1.

3.09 CONCRETE SLAB TOLERANCES

A. General:

1. The deviation from elevation for the top surface of the base slab, base mat, foundation slab, or foundations that is integral with the any of previously listed elements of a hydraulic structure, shall be in accordance with ACI 117 tolerances for a slab on ground, for cast in place concrete building.
2. Concrete slab tolerances are in accordance with ACI 117 tolerances for random traffic floor surface finishes, for cast-in-place concrete buildings.
3. Coordinate tolerance requirements with equipment manufacturers and comply with equipment manufacturers' requirements.
  - a. The most restrictive of equipment manufacturer's tolerance and tolerances specified below, must govern.

B. Slab Tolerances:

1. Slab tolerances must be in accordance with the following floor surface classifications as shown in Table 4.8.6.1 of ACI 117:
  - a. Slab Type S-A: Floor Surface Classification: Moderately flat.
  - b. Slab Type S-B: Floor Surface Classification: Flat.
2. Slab Elevation and Thickness:
  - a. Finish Slab Elevation: Slope slabs to floor drains and gutter. Slabs shall adequately drain regardless of tolerances.
  - b. Thickness: Maximum 1/4 inch minus or 1/2 inch plus from thickness shown. Where thickness tolerance will not affect slope, drainage, or slab elevation, thickness tolerance may exceed 1/2 inch plus.

3.10 BEAM AND COLUMN FINISHES

A. Type B-1: Match wall Type W-1.

B. Type B-2: Match wall Type W-2.

- C. Type B-3:
  - 1. Repair rock pockets.
  - 2. Fill air voids.
  - 3. Match wall Type W-5.
- D. Type C-1: Match wall Type W-1.
- E. Type C-2: Match wall Type W-2.
- F. Type C-3:
  - 1. Fill air pockets.
  - 2. Match wall Type W-5.

### 3.11 BACKFILL AGAINST STRUCTURES

- A. Do not backfill against walls until concrete has obtained specified 28-day compressive strength.
- B. Refer to General Structural Notes on the Drawings for additional requirements, including elevated slab and diaphragm completion prior to backfill.
- C. Unless otherwise permitted, place backfill simultaneously on both sides of structure, where such fill is required, to prevent differential pressures.

### 3.12 FIELD QUALITY CONTROL

- A. General:
  - 1. Unless otherwise noted, concrete field testing services will be provided by Owner.
  - 2. Provide adequate facilities for safe storage and proper curing of concrete test specimens onsite for first 24 hours, and for additional time as may be required before transporting to test lab.
  - 3. Unless otherwise specified, concrete will be sampled for making test specimens, from point of delivery.
  - 4. Unless otherwise specified, sampled concrete used to mold strength test specimens (ASTM C31/C31M) will be tested for slump (ASTM C143/C143M) or slump flow (ASTM C1611/C1611M), air content (ASTM C231/C231M), temperature (ASTM C1064/C1064M), and density (ASTM C138/C138M).

5. When measured air content at point of delivery:
  - a. Is greater than specified limit, a check test of air content will be performed immediately on a new sample from delivery unit. If check test fails, concrete has failed to meet requirements of Contract Documents.
  - b. If measured air content is less than lower specified limit, adjustments will be permitted in accordance with ASTM C94/C94M, unless otherwise specified. If check test of adjusted mixture fails, concrete has failed to meet requirements of Contract Documents.
  - c. Concrete that has failed to meet requirements of Contract Documents must be rejected.
6. If concrete is pumped, concrete will be sampled for testing air content at point of delivery and at point of placement.
  - a. For each concrete mixture: Once two consecutive results of air content testing taken at the point of placement, are within specified tolerances:
    - 1) Correlate air content test results at point of delivery and point of placement.
    - 2) Subsequent testing will be performed at point of placement based on the following criteria:
      - a) Every 4 hours minimum.
      - b) When air content test results at point of delivery deviate from correlated air content test result by an amount equal to the specified tolerance.
      - c) When required by Special Inspector or Owner.
7. Test specimens must be stored and cured in accordance with ASTM C31/C31M and tested in accordance with ASTM C39/C39M.
8. Frequency of testing may be changed at discretion of Special Inspector or Owner.
9. Evaluation and acceptance will be in accordance with ACI 301 and the Contract Documents.

B. Concrete Strength Test:

1. Unless otherwise specified, specimens will be made and tested as follows:
  - a. One test specimen at age of 7 days for information.
  - b. Two 6-inch diameter or three 4-inch diameter test specimens at age of 28 days for acceptance.
2. A minimum of one spare test specimen per sample.

C. Tolerances:

1. Concrete tolerances must comply with the more stringent of equipment manufacturers' tolerances, and specified tolerances.
2. Formed Surfaces:
  - a. Formed surface finishes must comply with specified requirements.
  - b. Tolerances of formed surfaces must comply with specified requirements and with ACI 117 for cast in place concrete buildings.
3. Unformed Surfaces:
  - a. Surface finishes must comply with specified requirements.
  - b. Unless otherwise specified, tolerances for unformed surface must conform to requirements of ACI 117 for cast in place concrete buildings.
  - c. Concrete slab tolerances must comply with specified requirements and with ACI 117 random traffic floor surface finish tolerances.
  - d. Slab elevation:
    - 1) Slabs must slope to drains.
    - 2) Top of concrete elevations must comply with specified requirements and ACI 117 for cast in place concrete buildings.
  - e. Slab thickness tolerance must comply with specified requirements and ACI 117 for cast in place concrete buildings.

D. Evaluation and Acceptance of Topping Slabs:

1. Sounding for Hollow Areas:
  - a. The topping surface will be sounded after 7-day curing period. Sounding will be executed by chain drag, light steel hammer tap, or electro-mechanical sounding device in accordance with ASTM D4580, listening for hollow sound to determine areas that may have not properly bonded to substrate concrete.
  - b. Hollow areas will be marked for further investigation via direct tension bond testing.
2. Direct Tension Bond Test:
  - a. A minimum of four in-situ bond tests are required per level.
  - b. Hollow areas identified by sounding will be investigated through in-situ bond testing.
  - c. In-Situ Bond Testing: Direct tension bond test will be in accordance with ASTM C1583/C1583M.
  - d. Locations of in-situ bond tests will be recorded.
  - e. Evaluation and Acceptance of Topping: 200 psi minimum in direct tension without failure or movement.
3. Disbonded, cracked, broken topping are non-compliant.
4. Non-compliant work must be repaired or replaced.

### 3.13 MANUFACTURER'S SERVICES

- A. Provide representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for installation assistance, inspection, and certification of proper installation for concrete ingredients, mix design, mixing, and placement.
  - 1. Concrete Producer Representative:
    - a. Observe how initial concrete mixes are performing.
    - b. Assist with concrete mix design, performance, placement, weather problems, and problems as may occur with concrete mix throughout Project, including instructions for redosing.
    - c. Establish control limits on concrete mix designs.
    - d. Provide equipment for control of concrete redosing for air entrainment or high-range, water-reducing admixture, superplasticizers, at Site to maintain proper slump and air content if needed.
  - 2. Admixture Manufacturer's Representative: Available for consultations as required to ensure proper installation and performance of specified products.
  - 3. Bonding Agent Manufacturer's Representative: Available for consultations as required to ensure proper installation and performance of specified products.

### 3.14 PROTECTION OF INSTALLED WORK

- A. After curing as specified in Section 03 39 00, Concrete Curing, and after applying final floor finish, cover slabs with plywood or particle board or plastic sheeting or other material to keep floor clean and protect it from material and damage as a result of other construction work.
- B. Repair areas damaged by construction, using specified repair materials and approved repair methods.

### 3.15 SCHEDULE OF CONCRETE FINISHES

- A. Form Tolerances: As specified in Section 03 10 00, Concrete Forming and Accessories.
- B. Special Floor Finishes: As specified in Section 03 35 00, Concrete Finishing.



## C. Provide concrete finishes as scheduled:

Area	Type of Finish	Required Form Tolerances
<b>Exterior Wall Surfaces</b>		
Abovegrade/exposed (above point 6" below finish grade)	W-2	W-B
Abovegrade/covered with brick veneer or other finish material	W-1	W-A
Backfilled/waterproofed (below point 6" below finish grade)	W-1	W-A
Backfilled/not waterproofed (below point 6" below final grade)	W-1	W-A
<b>Interior Wall Surfaces</b>		
Not painted or coated	W-2	W-A
To be painted or coated	W-5	W-A
<b>Exterior Slabs</b>		
Typical unless otherwise specified	S-5	S-A
Roof slab/exposed	S-5	S-B
Roof slab/covered with roofing material	S-1	S-A
Top of wall	S-5	S-B
Top of footing	S-2	S-A
Hydraulic Structures	S-5	S-A
Stairs and landings	S-5	S-B
Sidewalks	S-6	S-B

<b>Area</b>	<b>Type of Finish</b>	<b>Required Form Tolerances</b>
<b>Interior Slabs</b>		
Typical unless otherwise specified	S-1	S-B
Facility (20) Dewatering and Control Building, Truck Drive Through Area	S-5	S-B
Slabs to receive mortar setting bed for tile	S-2	S-A
Slabs to receive resilient flooring or carpet	S-1	S-A
Hydraulic Structures	S-1	S-A
Underside of elevated slabs	S-3	W-B
<b>Beams and Columns</b>		
Beams/coated	B-3	B-A
Beams/not coated	B-2	B-A
Columns/coated	C-3	C-A
Columns/not coated	C-2	C-A

### 3.16 SUPPLEMENTS

- A. Requirements of concrete mix designs following “End of Section,” are a part of this Specification and supplement requirements of Part 1 through Part 3 of this section:
1. Concrete Mix Design, Class 4500F0S1W2C2.
  2. Concrete Mix Design, Class CF00F0S1W0C1.

### END OF SECTION

**CONCRETE MIX DESIGN, CLASS 4500F0S1W2C2**

- A. Mix Locations: Typical, unless otherwise specified.
- B. Exposure Categories and Classifications: F0S1W2C2.
- C. Mix Properties:
  - 1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.40.
  - 2. Minimum concrete compressive strength ( $f'_c$ ) shall be 4,500 psi at 28 days.
  - 3. Air-entraining admixtures are prohibited in concrete mixtures and total air content shall not be greater than 3 percent, for the following:
    - a. Slabs to receive hard-troweled finish.
    - b. Slabs to receive dry shake floor hardener.
  - 4. Slabs to receive fiber reinforced concrete placed monolithically as two-course floor on top of plastic concrete.
  - 5. Coloring Admixture: When required in Contract Documents.
  - 6. Provide cementitious materials in accordance with one of the following:
    - a. ASTM C150/C150M Type II or V; inclusion of supplementary cementitious materials in design mix is optional.
    - b. ASTM C150/C150M types other than Type II or V in accordance with the following:
      - 1) Tricalcium Aluminate Content of Total Cementitious Materials: Maximum 8 percent by weight.
      - 2) ASTM C595/C595M Types excluding Type IS (greater than 70), conforming to ASTM C595/C595M, and having (MS) designation.
  - 7. Unless otherwise specified, mix designs for floors shall comply with 4.1.2.9 of ACI 301.
  - 8. For hydraulic structures, minimum cementitious materials content in mix design shall be as follows:
    - a. 515 pounds per cubic yard for concrete with 1-1/2-inch nominal maximum size aggregate.
    - b. 535 pounds per cubic yard for 1-inch nominal maximum size aggregate.
    - c. 560 pounds per cubic yard for 3/4-inch nominal maximum size aggregate.
    - d. 580 pounds per cubic yard for 1/2-inch nominal maximum size aggregate.
    - e. 600 pounds per cubic yard for 3/8-inch nominal maximum size aggregate.

- f. Unless otherwise permitted, limit cementitious materials content to 100 pounds per cubic yard greater than specified minimum cementitious materials content in mix design.
  - 9. Limit water-soluble, chloride-ion content in hardened concrete to 0.10 percent, unless otherwise specified.
    - a. Limits are stated in terms of chloride ions in percent by weight of cement.
    - b. Unless otherwise permitted, provide documentation from concrete tested in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.
- D. Refer to PART 1 through PART 3 of this section for additional requirements.

**CONCRETE MIX DESIGN, CLASS CF00F0S1W0C1**

A. Mix Locations:

1. Where fiber-reinforce concrete is required.
2. Electrical ductbanks.
3. Sidewalks and Curbs.

B. Exposure Categories and Classifications: F0S1W0C1.

C. Mix Properties:

1. Limit water to cementitious materials ratio (W/Cm) in mix design to maximum value of 0.45.
2. Minimum concrete compressive strength ( $f'_c$ ) shall be 4,500 psi at 28 days.
3. Air-entraining admixtures are prohibited in concrete mixtures and total air content shall not be greater than 3 percent, for the following:
  - a. Slabs to receive hard-troweled finish.
  - b. Slabs to receive dry shake floor hardener.
  - c. Slabs to receive fiber reinforced concrete placed monolithically as two-course floor on top of plastic concrete.
4. Provide cementitious materials in accordance with one of the following:
  - a. ASTM C150/C150M Type II or V; inclusion of supplementary cementitious materials in design mix is optional.
  - b. ASTM C150/C150M types other than Type II or V in accordance with the following:
    - 1) Tricalcium Aluminate Content of Total Cementitious Materials: Maximum 8 percent by weight.
    - 2) ASTM C595/C595M Types excluding Type IS (greater than 70), conforming to ASTM C595/C595M, and having (MS) designation.
5. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent, unless otherwise specified.
  - a. Limits are stated in terms of chloride ions in percent by weight of cement.
  - b. Unless otherwise permitted, provide documentation from concrete tested in accordance with ASTM C1218/C1218M at an age between 28 days and 42 days.
6. Coloring Admixture: When required in Contract Documents.
7. Fiber Reinforcement:
  - a. Where fiber reinforced concrete is required, provide polypropylene micro-fibers in design mix in accordance with Section 03 24 00, Fibrous Reinforcing.
  - b. Add fiber-reinforcement to mix in concrete plant.

D. Refer to PART 1 through PART 3 of this section for additional requirements.



**SECTION 03 35 00  
CONCRETE FINISHING**

**PART 1 GENERAL**

**1.01 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
  - 1. ASTM International (ASTM): C109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-In. or 50-Mm Cube Specimens).

**1.02 SUBMITTALS**

- A. Action Submittals: Manufacturer's product data sheet(s).
- B. Informational Submittals:
  - 1. Agenda: Conference prior to slab placement.
  - 2. Manufacturer's written procedures for floor hardener, product application, protection of finished surface, and post-application cleanup.
  - 3. Product manufacturers representatives' names and phone numbers.
  - 4. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, for products to be furnished.
  - 5. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.
  - 6. Statement of Qualifications:
    - a. Manufacturer's Product Service Record.
    - b. Application personnel.
    - c. Manufacturer's representative.
  - 7. Manufacturer's installation instructions.
  - 8. Manufacturer's written instructions for maintenance and repair of floor finishes installed.

**1.03 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Manufacturer's Product Service Record: Five previous projects at least 5 years old where product was used at representative coverage per square foot.

2. Floor Product Manufacturer: Manufacture components of floor material, in own plant and under control of trained quality control manager.
  3. Application Personnel: Four previous projects of successful installation of specified materials or manufacturer's training.
- B. Preinstallation Training: Manufacturer-approved training of application personnel and quality control inspectors for floor finishes.
- C. Conference Prior to Slab Placement:
1. Conducted by Contractor.
  2. Agenda:
    - a. Concrete mix design.
    - b. Placing techniques.
    - c. Finishing techniques.
    - d. Equipment required for these procedures.
  3. Attendees:
    - a. Contractor's superintendent.
    - b. Subcontractor's representative involved in slab installation and finishing.
    - c. Owner and/or Owner's Representative.

## **PART 2 PRODUCTS**

### **2.01 FLOOR HARDENER**

- A. Colorless, aqueous solution of zinc and magnesium fluorosilicate.
- B. Each gallon of solution shall contain a minimum of 2 pounds of fluorosilicate compound.
- C. Manufacturers and Products:
1. Master Builders Solutions US, Shakopee, MN; MasterKure HD 300WB.
  2. Euclid Chemical Co., Cleveland, OH; Surfhard.

## **PART 3 EXECUTION**

### **3.01 FLOOR HARDENER APPLICATION**

- A. Apply where indicated on Interior Finish Schedule.
- B. Before application, thoroughly cure floors to receive treatment for minimum 28 days, keep clean, unpainted, free from membrane curing compounds, and perfectly dry with all Work above them completed.



- C. Apply hardener evenly to surface, using three coats, allowing 24 hours between coats.
1. First coat 1/3 strength, second coat 1/2 strength, and third coat 2/3 strength, mix with water.
  2. Apply each coat so as to remain wet on surfaces for 15 minutes.
  3. Apply approved treatment in accordance with manufacturer's instructions.
  4. After final coat is completed and dry, remove surplus hardener from surface by scrubbing and mopping with water.

3.02 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for installation assistance, inspection and certification of proper installation, and training of application personnel.
1. Technical assistance with design and adjustment of concrete mixes to receive floor finishes.
  2. Technical assistance to assure and certify application and installation of system being used.
  3. Consultation, direction, and certification for full-scale application of floor finishes, and at other times as needed.
  4. Attendance at the conference prior to slab placement to finalize proper methods and procedures.

**END OF SECTION**



**SECTION 03 39 00  
CONCRETE CURING**

**PART 1 GENERAL**

**1.01 REFERENCES**

A. The following is a list of standards which may be referenced in this section:

1. American Concrete Institute (ACI): 308.1, Specification for Curing Concrete.
2. ASTM International (ASTM):
  - a. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - b. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

**1.02 SUBMITTALS**

A. Action Submittals:

1. Manufacturers' data indicating compliance with the requirements specified herein for the following products:
  - a. Evaporation retardant.
  - b. Curing compound.
  - c. Penetrating water repellent sealer.
  - d. Clear liquid densifier.
2. Curing methods proposed for each type of element such as slab, walls, beams, and columns in each facility.

B. Informational Submittals:

1. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements, for the following:
  - a. Curing compound showing moisture retention requirements.
  - b. Retardants for exposed aggregate finish.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

A. Curing Compound:

1. Water-based, high-solids content, nonyellowing, curing compound meeting requirements of ASTM C1315 Type I, Class A.

2. Manufacturers and Products:
  - a. Euclid Chemical Co., Cleveland, OH; Super Diamond Clear VOX.
  - b. WR Meadows, Inc., Hampshire, IL; VOCOMP-30.
  - c. Vexcon Chemical, Inc.; Philadelphia, PA; Starseal 1315.
  - d. Dayton Superior; Safe Cure and Seal 1315 EF.
- B. Evaporation Retardant:
  1. Optional: Fluorescent fugitive dye color tint that disappears completely upon drying.
  2. Manufacturers and Products:
    - a. Master Builders Solutions US, Shakopee, MN; MasterKure ER 50.
    - b. Euclid Chemical Co., Cleveland, OH; Eucobar.
- C. Penetrating Water Repellent Sealer: Water based, ready to use, single component, silane/siloxane, penetrating, clear water repellent sealer.
  1. Viscosity: 50 cps.
  2. Flash Point: 200 degrees F.
  3. NCHRP No. 244 Reduction in Chloride Content:
    - a. Average: 82 percent.
    - b. Minimum Required: 75 percent.
  4. NCHRP No. 244 Reduction in Weight Gain:
    - a. 21 Days: 85 percent.
    - b. VOCs: 50 g/l.
    - c. Depth of Penetration: 1/4 inch.
  5. Manufacturers and Products:
    - a. Master Builders Solutions US, Shakopee, MN; MasterProtect H 400.
    - b. Euclid Chemical Co.; Baracade WB 244.
- D. Floor Hardener: See Section 03 35 00, Concrete Finishing.
- E. Water: Clean and potable, containing less than 500 ppm of chlorides.

## **PART 3 EXECUTION**

### **3.01 CONCRETE CURING**

- A. General:
  1. Cure all concrete in accordance with Project Specifications and ACI308.1.

2. Where surfaces are to receive coatings, painting, cementitious material, or other similar finishes, use only moist curing procedures. Refer to Interior Finish Schedule for surfaces to receive coatings.
3. Use only moist curing on hydraulic structures.
4. Where curing compound cannot be used, moist curing as described below or special methods using moisture shall be agreed upon with Owner prior to placing concrete.
5. As required in Section 03 30 00, Cast-in-Place Concrete, if result of 7-day concrete strength test is less than 50 percent of specified 28-day strength, extend period of moist curing specified below, by 7 additional days.

B. Use one of the following methods as approved by Owner:

1. Vertical Surfaces
  - a. Method 1: Leave concrete forms in place and keep surfaces of forms and concrete moist for 7 days.
  - b. Method 2: Continuously sprinkle with water 100 percent of exposed surfaces for 7 days starting immediately after removal of forms.
  - c. Method 3: Apply curing compound, where allowed, immediately after removal of forms.
2. Horizontal Surfaces:
  - a. Method 1: Protect surface by water ponding for 7 days.
  - b. Method 2: Cover with burlap or cotton mats and keep continuously moist for 7 days.
  - c. Method 3: Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously moist for 7 days.
  - d. Method 4: Continuously sprinkle exposed surface for 7 days.
  - e. Method 5: Apply curing compound, where allowed, immediately after final finishing when surface will no longer be damaged by traffic.

3.02 EVAPORATION RETARDANT APPLICATION

- A. Use on flatwork when environmental conditions are anticipated to cause rapid drying of the concrete surface.
- B. Spray onto surface of fresh flatwork concrete immediately after screeding to react with surface moisture.
- C. Reapply as needed to ensure a continuous moist surface until final finishing is completed.

3.03 PENETRATING WATER REPELLENT SEALER APPLICATION

- A. Apply where indicated on Interior Finish Schedule.
- B. Before application and with Work above completed, moist cure concrete walls and floors for a minimum of 28 days to receive sealer, keep clean, unpainted, and free from membrane curing compounds.
- C. Concrete to receive penetrating sealer shall be dry for a minimum 24 hours immediately prior to application.
- D. Apply per manufacturer's recommendations utilizing low pressure airless spray equipment.
  - 1. Actual coverage and number of coats to be determined by field test sample application and water absorption testing. Final approval by Owner is required.
- E. Apply at a coverage rate of 125 square feet per gallon to 200 square feet per gallon. Cure penetrating sealer on slabs for the minimum time recommended by manufacturer prior to allowing foot or vehicular traffic.

3.04 FLOOR HARDENER APPLICATION

- A. See Section 03 35 00, Concrete Finishing.

3.05 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site for installation assistance, inspection, and certification of proper installation for products specified.
- B. Provide penetrating water repellent sealer manufacturer's representative to demonstrate proper application of product.
- C. Provide clear liquid densifier manufacturer's representative to demonstrate proper mixing and application of product.
- D. Provide curing compound manufacturer's representative to demonstrate proper application of curing compound to show coverage in one coat.
- E. Provide retardant for exposed aggregate surfaces manufacturer's representative to demonstrate proper application and surface mortar removal procedures.

**END OF SECTION**

**SECTION 03 40 00  
PRECAST CONCRETE**

**PART 1      GENERAL**

**1.01      GENERAL**

- A. Unless otherwise specified, precast structural concrete shall be in accordance with Sections 13 and 14 of ACI 301, Specifications for Structural Concrete.

**1.02      REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
  - 1. American Concrete Institute (ACI):
    - a. ACI/TMS 216.1, Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies.
    - b. ACI 301, Specifications for Structural Concrete.
    - c. ACI 318-14, Building Code Requirements for Structural Concrete.
    - d. ITG-7, Specifications for Tolerances for Precast Concrete.
  - 2. ASTM International (ASTM):
    - a. A36/A36M, Standard Specification for Carbon Structural Steel.
    - b. A416/A416M, Standard Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete.
    - c. A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
    - d. C31/C31M, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
  - 3. Precast/Prestressed Concrete Institute (PCI):
    - a. MNL-116, Manual for Quality Control for Plants and Production of Structural Concrete Products.
    - b. MNL-117, Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.
    - c. MNL-120, Design Handbook for Precast and Prestressed Concrete, Eight Edition.
    - d. MNL-135, Tolerance Manual for Precast and Prestressed Concrete Construction.

**1.03      DEFINITIONS**

- A. The following precast concrete elements are precast structural concrete:
  - 1. Hollow-Core Precast Plank.
  - 2. Precast Double-Tee.
  - 3. Precast Beam.

4. Stair Slab.
5. Precast Wall Panels.
6. Main Entry Sign (Additive Alternate No. 8).

- B. Exposed to View in Finished Construction: Neglect presence of sealants, stain, paint, or other coatings on the surface.

#### 1.04 SUBMITTALS

- A. Action Submittals: Unless otherwise specified, in accordance with ACI 301.

1. Shop Drawings:
  - a. Detail fabrication and installation of structural precast concrete units including connections at member ends and to each adjoining member.
  - b. Indicate locations, plan views, elevations, dimensions, shapes, and cross sections of each unit, openings, support conditions and types of reinforcement, including special reinforcement.
  - c. Indicate aesthetic intent including joints, rustications or reveals, and extent and location of each surface finish.
  - d. Indicate welded connections by AWS standard symbols. Show size, length, and type of each weld.
  - e. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
  - f. Indicate locations, tolerances and details of anchorage devices to be embedded in or attached to structure or other construction.
  - g. Include and locate openings larger than 10 inches. Where additional structural support is required for openings include header design.
  - h. Coordinate and indicate openings and inserts required by other trades.
  - i. Indicate location of each structural precast concrete member by same identification mark placed on unit.
  - j. Indicate relationship of structural precast concrete members to adjacent materials.
  - k. Indicate locations and details of joint treatment.
  - l. Indicate areas receiving toppings and magnitude of topping thickness.
  - m. Indicate estimated cambers for floor slabs receiving cast-in-place topping.
  - n. Indicate multiple wythe connection devices.
  - o. Indicate shim sizes and grouting sequence.
  - p. Include temporary bracing and shoring.



2. Welding Certificates.
  3. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, notify Owner and submit design calculations and shop drawings. Do not affect the appearance, durability or strength of members when modifying details or materials. Maintain the general design concept when altering size of members and alignment.
- B. Informational Submittals: Unless otherwise specified, in accordance with ACI 301.
1. Structural Design Submittal: In accordance with ACI 301, including shop drawings as an appendix to the calculations.
  2. Qualification Data: For Fabricator, Erector, and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
    - a. Fabricator Qualifications.
    - b. Current PCI Plant Certification.
    - c. Current PCI Erector Certification.
  3. Welding Certificates: Copies of certificates for welding procedure specifications (WPS) and personnel certification.
  4. Material Test Reports for aggregates: From an accredited testing agency, indicating and interpreting test results for compliance with requirements indicated.
  5. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements.
    - a. Cementitious materials.
    - b. Reinforcing materials and prestressing tendons.
    - c. Admixtures.
    - d. Bearing pads.
    - e. Stainless steel shapes and sections.
    - f. Insulation.
    - g. Other components specified in Contract Documents with applicable standards.
  6. Coloring Admixture: Product data including application rate and color chart.
  7. Crystalline Waterproofing Admixture: Product data including catalog cut, technical data, storage requirements, product life, recommended dosage, temperature considerations and conforming standards.
  8. Field quality-control test reports.

## 1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that complies with the following requirements and is experienced in producing structural precast concrete units similar to those indicated for this Project and with a record of successful in-service performance.
1. Assumes responsibility for engineering structural precast concrete units to comply with performance requirements. This responsibility includes preparation of shop drawings and comprehensive engineering analysis by a qualified professional engineer.
  2. Professional Engineer Qualifications: A professional engineer licensed in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of structural precast concrete that are similar to those indicated for this Project in material, design, and extent.
  3. Precast Concrete and Precast Prestressed Concrete: Product of manufacturer with 3 years' experience producing precast concrete products of quality specified.
  4. Precast Plant: Manufacturing plant shall be certified by the PCI Plant certification Program.
    - a. Manufacturer shall be certified at time of bidding.
    - b. Certification shall be in product group and category as appropriate for each type of precast concrete elements:
      - 1) C1 – Precast Concrete Products (No Prestressed Reinforcement).
      - 2) C2 – Prestressed Hollow-Core and Repetitively Produced Products.
      - 3) C3 – Prestressed Straight-Strand Structural Members.
      - 4) CA – Commercial products with an Architectural Finish.
    - c. Has sufficient production capacity to produce required members without delaying the Work.
    - d. Certification shall be maintained throughout the production of the precast concrete units. Production shall immediately stop if at any time the fabricator's certification is revoked, regardless of the status of completion of contracted work. Production will not be allowed to re-start until the necessary corrections are made and certification has been re-established. In the event certification(s) cannot be re-established in a timely manner, causing Project delays, the fabricator, at no additional cost, will contract out the remainder of the units to be manufactured at a PCI certified plant.

- B. Qualifications of Precast Erector:
1. Erector Qualifications: A precast concrete erector Qualified by the Precast/Prestressed Concrete Institute (PCI) prior to beginning work at the jobsite. Submit a current Certificate of Compliance furnished by PCI designating qualification in Category S2 (Complex Structural Systems) for load-bearing members.
  2. Erector Certification: A precast concrete erector with erecting organization and all erecting crews Certified and designated, prior to beginning work at Project Site, by PCI's Certificate of Compliance to erect Category S2 (Complex Structural Systems) for load-bearing members).
  3. In the Event Erector Qualifications and Certifications cannot be met: A precast concrete erector who has retained a PCI Certified Field Auditor, at erector's expense, to conduct a field audit of a project in the same category as this Project prior to start of erection. Submits Erectors' Post Audit Declaration.
- C. Calculations stamped by an engineer registered in the same state as the Project.
- D. Design Standards: Comply with ACI 318 and the design recommendations of PCI MNL 120 applicable to types of structural precast concrete members indicated.
- E. Quality-Control Standard: For manufacturing procedures and testing requirements and quality control recommendations for types of members required, comply with PCI MNL 116.
- F. Comply with camber and dimensional tolerances of PCI MNL 135 and ACI ITG-7. In the event of conflict, the more restrictive criteria governs.
- G. Product Options: Drawings indicate size, profiles and dimensional requirements of precast concrete members and are based on the specific types of members indicated. Other fabricators' precast concrete members complying with requirements may be considered.
- H. Welding: Unless otherwise specified, in accordance with Section 05 05 23, Welding.
- I. Fire Resistance: Where indicated, provide structural precast concrete members whose fire resistance satisfy the fire resistance ratings of the Contract Documents and meets the prescriptive requirements of the governing code or has been calculated according to ACI 216.1/TMS 216.1, and is acceptable to authorities having jurisdiction.

- J. Sample Panels: After sample approval and before fabricating precast concrete wall panels, produce a minimum of three sample panels approximately 16 ft<sup>2</sup> in area for review by Owner. Incorporate full-scale details of architectural features, finishes, textures, and transitions in sample panels.
1. Locate panels where indicated in Contract Document or, if not indicated, as directed by Owner.
  2. Damage part of an exposed-face surface for each finish, color, and texture, and demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
  3. After acceptance of repair technique, maintain one sample panel at the fabricator's plant and one at the Project Site in an undisturbed condition as a standard for judging the completed Work.
  4. Demolish and remove sample panels when directed.
- K. Mockups: After sample panel approval but before production of architectural precast concrete units, construct full-sized mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Mockups shall be representative of the finished work including architectural precast concrete complete with brick facing, anchors, connections, flashings, and joint fillers as accepted on the final Shop Drawings. Surface finish and color shall be uniform in appearance to Samples. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in the location and of the size indicated in Contract Documents or, if not indicated, as directed by Owner.
  2. Notify Owner in advance of dates and times when mockups will be constructed.
  3. Obtain Owner's approval of mockups before starting fabrication of precast concrete units.
  4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  5. Demolish and remove mockups when directed.
  6. Approval of mockups does not constitute approval of deviations from the Contract Documents unless such deviations are specifically approved by Owner in writing.
- L. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01 31 19, Project Meetings.

## 1.06 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide structural precast concrete members and connections capable of withstanding design loads indicated on Drawings, and to resist handling, transportation, and erection stresses, whichever governs, and except as follows:
  - 1. Dead Loads:
    - a. Self-weight.
    - b. Weight of topping slab, where required.
  - 2. Design structural precast concrete framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of building structure, and other building movements.
  - 3. Unless otherwise noted, maintain structural precast concrete deflections within limits of ACI 318.
  - 4. Limit long-term camber growth to span length divided by 360. Long term camber growth for members supporting cranes shall be limited to span length divided by 800.
  - 5. Thermal Movements: Provide for thermal movements where noted.
    - a. The precast system design shall consider the maximum seasonal climatic temperature change.
    - b. In plane thermal movements of individual members directly exposed to the sun shall consider a temperature range of 30 degrees Fahrenheit to 95 degrees Fahrenheit.
      - 1) Member connection design shall consider through thickness thermal gradients as appropriate.
  - 6. Fire Resistance Rating: Provide components to meet the following fire ratings:
    - a. (20) Dewatering Building: In accordance with 20-A-2001.
    - b. (50) Chlorine and SO<sub>2</sub> Building: In accordance with 50-A-2001.
  - 7. Crack Control: PCI MNL-120.

## 1.07 DELIVERY AND HANDLING

- A. Deliver all structural precast concrete members in such quantities and at such times to assure compliance with the agreed upon project schedule and setting sequence to ensure continuity of installation.
- B. Handle and transport members in a manner to avoid excessive stresses that could cause cracking or other damage.
- C. Store units with adequate dunnage and bracing, and protect units to prevent contact with soil, staining, and to control cracking, distortion, warping or other physical damage.

- D. Unless otherwise specified or shown on Shop Drawings, store members with dunnage across full width of each bearing point.
- E. Place stored members so identification marks are clearly visible, and units can be inspected.
- F. Place dunnage of even thickness between each member.
- G. Lift and support members only at designated points indicated on the Shop Drawings.

#### 1.08 SEQUENCING

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

### **PART 2 PRODUCTS**

#### 2.01 FORMWORK

- A. Forms: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required surface finishes.
- B. Form-Release Agent: Commercially produced form-release agent that will not bond with, stain or affect hardening of precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.

#### 2.02 STEEL REINFORCEMENT

- A. Unless otherwise noted, in accordance with Section 03 21 00, Steel Reinforcement.
  - 1. Prestressing Strand: ASTM A 416/A 416M, Grade 250 (Grade 1720) or Grade 270 (Grade 1860), uncoated, 7-wire, low-relaxation strand or ASTM A 886/A 886M, Grade 270 (Grade 1860), indented, 7-wire, low-relaxation strand (including supplement).
  - 2. Supports: Use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116 and as follows:
    - a. Plastic Protected Wire Bar Supports: In compliance with ANSI/CRSI – RB 4.1 Class 1 Reinforcement Supports.

- b. Stainless Steel Protected Wire Bar Supports: In compliance with ANSI/CRSI – RB 4.1 Class 2 Reinforcement Supports, except legs shall be made wholly from stainless steel wire.
- c. Precast Concrete Bar Supports: In compliance with ANSI/CRSI – RB 4.1 Cementitious (Precast) Reinforcement Supports.
  - 1) Precast concrete bar supports shall have equal or greater strength than the surrounding concrete.
  - 2) Precast concrete bar supports shall be four square inches minimum, in plan.
  - 3) Precast concrete bar supports shall have tie wires.

## 2.03 CONCRETE MATERIALS

- A. Unless otherwise specified, in accordance with 03 30 00, Cast-In-Place Concrete.
  - 1. Cementitious Materials:
    - a. Portland Cement:
      - 1) ASTM C150, Type I or III may be used provided compliance with specified exposure categories and classifications requirements can be achieved.
      - 2) For surfaces exposed to view in finished structure, use same type, brand, and mill source throughout the precast concrete production.
      - 3) Provide white cement for concrete mixtures that include coloring admixture.
    - b. Fly Ash: Maximum loss on ignition of 3 percent.
  - 2. Normal-Weight Aggregates:
    - a. Except as modified by PCI MNL 116, ASTM C 33, with coarse, aggregates complying with Class 4M.
    - b. Resistance to alkali reaction shall be in accordance with 03 30 00, Cast-In-Place Concrete.
    - c. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
    - d. Aggregate: 3/4-inch maximum size.
    - e. Furnish of consistent quality, gradation, and color for precast architectural panels to produce uniformity of appearance in all panels.
  - 3. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.

4. Chemical Admixtures:
  - a. Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
  - b. Corrosion Inhibiting Admixture: ASTM C1582/C1582M.
  - c. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or liquid coloring admixtures, temperature stable nonfading and resistant to lime and other alkalis.
    - 1) Color: As selected by Owner from manufacturer's full range.
  - d. Provide Crystalline Waterproofing Admixture in Precast Wall Panels: Conform to permeability-reducing admixture for hydrostatic conditions (PRAH) as defined in Chapter 15 of ACI 212.3R. Crystalline concrete waterproofing system that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete. The system shall cause the concrete to become sealed against penetration of liquids from any direction. Concrete samples treated with the integral waterproofing admixture shall exhibit no measurable leakage when pressure tested in accordance with CRD-C48-73 to 200 psi or have certifying compliance with EN 934-2LS009 A1:2012. Integral waterproofing admixtures shall be Xypex Admix C-500 by Xypex Chemical Corporation, Krystol Internal Membrane by Krystol International Inc, or approved equal.

## 2.04 STAINLESS STEEL CONNECTION MATERIALS

- A. Stainless-Steel Plate: ASTM A666, Type 304, Type 316, or Type 201, of grade suitable for application.
- B. Stainless-Steel Bolts and Studs: ASTM F593, alloy 304 or 316, hex-head bolts and studs; stainless-steel nuts; and flat, stainless-steel washers.
  1. Lubricate threaded parts of stainless steel bolts with an anti-seize thread lubricant during assembly.
- C. Stainless-Steel Headed Studs: ASTM A276, with minimum mechanical properties for studs as indicated under MNL 116, Table 3.2.3.
- D. Furnish inserts for lifting tilt-up walls, bolting stiffeners, attaching braces, and as otherwise required.



## 2.05 BEARING PADS AND OTHER ACCESSORIES

- A. Provide one of the following bearing pads for structural precast concrete members as recommended by precast fabricator for application:
1. Elastomeric Pads: AASHTO M251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore A durometer according to ASTM D2240, minimum tensile strength 2250 psi (15.5 MPa) per ASTM 412.
  2. Random-Oriented, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. Surface hardness of 70 to 90 Shore A durometer according to ASTM D2240. Capable of supporting a compressive stress of 3,000 psi (20.7 Mpa) with no cracking, splitting or delaminating in the internal portions of the pad.
  3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer. Surface hardness of 80 to 100 Shore A durometer according to ASTM D2240. Conforming to Division II, Section 18.10.2 of AASHTO LRFD Bridge Design Specifications or Military Specification, MIL-C-882E.
  4. Frictionless Pads: Polytetrafluoroethylene (PTFE), glass-fiber reinforced, bonded to stainless or mild-steel plates, or random-oriented, fiber-reinforced elastomeric pads, of type required for in-service stress.
  5. High-Density Plastic: Multimonomer, nonleaching, plastic strip capable of supporting loads with no visible overall expansion.
  6. Hardboard: AHA A135.4, Class 1, tempered hardboard strips, smooth on both sides.
- B. Reglets: In accordance with Section 07 62 00, Sheet Metal Flashing and Trim.
- C. Erection Accessories: Provide clips, hangers, high density plastic or stainless steel shims, and other accessories required to install structural precast concrete members.
- D. Welding Electrodes: In accordance with Section 05 05 23, Welding.

## 2.06 GROUT MATERIALS

- A. At Keyed Joints Between Hollow-Core Units:
1. Sand-Cement Grout:
    - a. Portland cement, ASTM C150, Type I, and clean, natural sand, ASTM C144, or ASTM C404.
    - b. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration.

- c. Water-soluble chloride ion content of grout less than 0.06 percent chloride ion by weight of cement when tested in accordance with ASTM C1218/C1218M.
  - d. F'c shall be greater than 3,000 psi at 28-day.
- 2. Nonshrink, non-metallic Type II grout in accordance with Section 03 62 00, Grouting.

B. At Bearing Conditions:

- 1. Nonshrink, nonmetallic Type II grout in accordance with Section 03 62 00, Grouting.
  - a. Non-shrink grout shall comply with ASTM C1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application with a 30-minute working time.
  - b. Water-soluble chloride ion content of grout less than 0.06 percent chloride ion by weight of cement when tested in accordance with ASTM C1218/C1218M.
- 2. Where grout location will be visible final construction, hold back non-shrink grout 1 inch from visible surface. Fill the outer 1 inch space with sand-cement grout in Article 2.06 A.1., colored to match precast.

2.07 INSULATED PANEL ACCESSORIES:

- A. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation complying with ASTM C591; Grade 1, or ASTM C1289 Type: 1.8 lb/ft<sup>3</sup> square edged; unfaced. R-Value: 7.5 min.
- B. Wythe Connectors: As required by manufacturer to connect wythes of precast concrete panels.

2.08 PRECAST PRESTRESSED CONCRETE MEMBERS

- A. Hollow-Core Plank: As shown on Drawings.
- B. Double-Tees: As shown on Drawings.
- C. Structural Wall Panels with Architectural Finish: As shown on Drawings.
- D. Main Entry Sign (Additive Alternate No. 8): As shown on Drawings.

## 2.09 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at structural precast concrete fabricator's option.
- C. Normal-Weight Concrete Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 301, with materials to be used on Project, to provide normal-weight concrete with the following properties:
  - 1. Design Strength: 5,000 psi at 28 days minimum.
  - 2. Release Strength: As required by design.
  - 3. Concrete mix designs shall conform to ACI 301 for the following exposure categories and classifications:
    - a. Freezing and Thawing: F0.
    - b. Sulfate: S1.
    - c. In Contact with Water: W1.
    - d. Corrosion Protection of Reinforcement: C2.
- D. If air-entrainment is required by PCI MNL 116 or ACI 301, add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content which complies with those standards.
- E. Color Pigment: Where required, add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.
- F. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.
- G. Concrete Mixture Adjustments: Concrete mixture design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.
- H. For colored precast concrete, coordinate ingredients and procedures to achieve uniformity of color.

## 2.10 FORM FABRICATION

- A. Form: Accurately construct forms, mortar tight, of sufficient strength to withstand pressures due to concrete placement and vibration operations and temperature changes, and for prestressing and detensioning operations. Coat contact surfaces of forms with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
- B. Maintain forms to provide completed structural precast concrete members of shapes, lines, and dimensions indicated in Contract Documents, within fabrication tolerances specified.
- C. Edge and Corner Treatment: Unless otherwise noted, provide uniformly chamfered or as built-in on standard forms.

## 2.11 FABRICATION

- A. General: Unless otherwise specified, in accordance with ACI 301 and within tolerances of ITG-7.
- B. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement. Do not relocate bearing plates in members unless approved by Owner.
  - 1. Weld headed studs and deformed bar anchors used for anchorage in accordance with Section 05 05 23, Welding.
- C. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, hangers, and other hardware shapes for securing precast concrete members to supporting and adjacent construction.
- D. Cast-in reglets, slots, and other accessories in structural precast concrete members as indicated on Contract Drawings.
- E. Cast-in openings larger than 10 inches (250 mm) in any dimension. Do not drill or cut openings or prestressing strand without Owner's approval.
- F. Reinforcement: Unless otherwise specified, in accordance with ACI 301 for fabricating, placing, supporting, cleaning reinforcement.

- G. Place reinforcing steel and prestressing tendons to maintain the cover requirements in accordance with ACI 318 for specified exposure categories and classifications, and as required for fire-resistance rating, whichever is greater.
- H. After concrete batching, no additional water may be added.
- I. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete members.
  - 1. Place backup concrete to ensure bond with face-mixture concrete.
- J. Thoroughly consolidate placed concrete by vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 116.
  - 1. Place self-consolidating concrete without vibration in accordance with PCI TR-6 "Interim Guidelines for the Use of Self-Consolidating Concrete." If face and backup concrete is used, ensure adequate bond between concrete mixtures.
- K. Prestress tendons for structural precast concrete members by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.
  - 1. Delay detensioning or post-tensioning of precast prestressed concrete members until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under the same conditions as concrete member.
  - 2. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat-cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
  - 3. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
- L. Recess strand ends and anchorages a minimum of 1 inch (25 mm), fill with non-metallic, non-shrink mortar and sack rub surface. Coat or spray the inside pocket surfaces with a bonding agent before installing mortar.

- M. Identify pickup points of precast concrete members and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast concrete member on a surface that will not show in finished structure.
- N. Cure concrete in accordance with ACI 301, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure members until compressive strength is high enough to ensure that stripping does not have a negative effect on the performance or appearance of final product.

## 2.12 INSULATED PANEL CASTING

- A. Cast, screed and consolidate bottom concrete wythe supported by form.
- B. Place insulation boards, abutting edges and ends of adjacent boards. Stagger end joints between rows to minimize cold joints. Stagger joints of insulation layers one-half board apart. Insert wythe connectors through insulation, and consolidate concrete around connectors according to connector manufacturer's written instructions.
- C. Cast and screed top wythe and apply required finish.
- D. Maintain temperature below 150 degrees F (65 deg. C) in bottom cast concrete wythe.

## 2.13 FABRICATION TOLERANCES

- A. Fabricate structural precast concrete members of shapes, lines and dimensions indicated, so each finished member complies with ACI ITG-7 product tolerances as well as position tolerances for cast-in items.

## 2.14 FINISHES

- A. Typical Unless Otherwise Specified, Provide Standard Grade Finish: Normal plant-run finish produced in forms that impart a smooth finish to concrete. Surface holes smaller than 1/2 inch caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls are acceptable. Fill air holes greater than 1/4 inch in width that occur in high concentration (more than one per 2 in.<sup>2</sup>). Major or unsightly imperfections, honeycombs, or structural defects are not permitted. Allowable joint offset limited to 1/8 inch.
- B. Precast Concrete Surfaces Receiving Concrete Topping: Apply raked or roughened surface finish in accordance with ACI 318, to precast concrete members that will receive concrete topping.

C. Interior Surfaces of Precast Wall Panels:

1. Strike off and consolidate concrete with vibrating screeds to a uniform finish, float finish. Hand screed at projections.
2. Surfaces That Will Not Be Exposed to View in Finished Construction: Normal color variations, minor indentations, minor chips, and spalls are permitted. No major imperfections, honeycombing, or defects are permitted.
3. Surfaces That Will Be Exposed to View in Finished Construction : Provide Steel Trowel Finish S-1 as specified in Section 03 30 00, Cast-In-Place Concrete.
  - a. Provide sample panel(s).
  - b. Extent to which float or trowel marks, variations of texture, or other surface blemishes will be permitted, shall be determined through sample panel(s).
  - c. Meet standard of quality represented by approved mockup panel.

D. Exterior Surfaces of Precast Wall Panels That Will Be Exposed to View in Finished Construction:

1. Provide grade A finish to concrete surfaces exposed to view. Repair all surface blemishes and fill all air holes with the exception of air holes 1/16 inch in width or smaller and form marks where the surface deviation is less than 1/16 inch. Float-apply a neat cement-paste coating to exposed surfaces. Rub dried paste coat with burlap to remove loose particles. Discoloration is permitted at form joints. Grind smooth all form joints.
2. Provide color admixture for each finish texture specified. Colors to be selected by Owner.
3. Surface texture of wall panels shall be a combination of the following precast panel finishes as shown on the Drawings:
  - a. Acid Etched.
  - b. Sandblast.
  - c. Brick Veneer (Brick facing to match the existing Administration Building.)

2.15 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 116 requirements. If using self-consolidating concrete also test and inspect according to PCI TR-6 "Interim Guidelines for the Use of Self-Consolidating Concrete" and ASTM C1611/C1611M, ASTM C1712, ASTM 1610/1610M, and ASTM C1621/C1621M.

- B. In addition to PCI Certification, Owner may employ an accredited independent testing agency to evaluate structural precast concrete fabricator's quality-control and testing methods.
  - 1. Allow Owner's testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.
- C. Testing: If there is evidence that strength of precast concrete members may be deficient or may not comply with ACI 301 requirements, fabricator shall employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C42/C42M and ACI 301. Strength of precast concrete members will be considered deficient if units fail to comply with ACI 301 concrete strength requirements for cored samples.
  - 1. Test results shall be reported in writing on the same day that tests are performed, with copies to Owner, Contractor, and precast concrete fabricator. Test reports shall include the following:
    - a. Project identification name and number.
    - b. Date when tests were performed.
    - c. Name of precast concrete fabricator.
    - d. Name of concrete testing agency.
    - e. Identification letter, name, and type of precast concrete member(s) represented by core tests; design compressive strength; type of failure; actual compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- D. Patching: If core test results are satisfactory and precast concrete members comply with requirements, clean and dampen core holes and solidly fill with precast concrete mixture that has no coarse aggregate, and finish to match texture and color of adjacent precast concrete surfaces.
- E. Acceptability. Structural precast concrete members that do not comply with acceptability requirements in ACI 301 and ACI ITG-7, including concrete strength, and manufacturing tolerances, are unacceptable. Chipped, spalled or cracked members may be repaired. Replace unacceptable units with precast concrete members that comply with requirements.



## **PART 3      EXECUTION**

### **3.01      PREPARATION**

- A.    Furnish loose connection hardware and anchorage devices for precast concrete members to be embedded in or attached to the building structural frame or foundation before starting that Work. Provide locations, setting diagrams, templates and instructions for the proper installation of each anchorage device.

### **3.02      EXAMINATION**

- A.    Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting precast concrete performance.
- B.    Proceed with precast concrete installation only after unsatisfactory conditions have been corrected.
- C.    Contractor shall notify precast concrete erector that supporting cast-in-place concrete foundation and building structural framing has attained minimum allowable design compressive strength or supporting steel or other structure is structurally ready to receive loads from precast concrete members prior to proceeding with installation.

### **3.03      ERECTION**

- A.    Install loose clips, hangers, bearing pads, and other accessories required for connecting structural precast concrete members to supporting members and backup materials.
- B.    Verify that anchorage inserts are in correct locations.
- C.    General:
  - 1.    Erect structural precast concrete level, plumb and square within the specified allowable erection tolerances. Provide temporary structural framing, shoring and bracing as required to maintain position, stability, and alignment of members until permanent connections are completed.
    - a.    Install temporary steel or plastic spacing shims or bearing pads as precast concrete members are being erected. Surface weld steel shims to each other to prevent shims from separating.
    - b.    Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.

- c. Remove projecting lifting devices and use plastic patchcaps or sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast concrete surfaces when recess is exposed.
- d. Unless otherwise indicated provide uniform joint widths of 3/4 inches.
- e. Provide and install headers of structural-steel shapes for openings larger than one slab width according to hollow-core slab fabricator's written recommendations.

D. Wall Panels:

- 1. Lifting and Setting Panels in Position:
  - a. Caution: Walls or panels are not stable in themselves against lateral loads, such as wind until construction is complete. Provide bracing as required.
  - b. Do not move panels until concrete has obtained the design field strength required by design calculation for handling stresses, including impact. Field strength shall be determined by test cylinders.
  - c. Pickup Lines: Provide equal lifting force at panel pickup points, applied simultaneously and acting at right angles to panel.
  - d. Excessive Stresses or Shock Loading: Prevent when lifting panel from casting surface, consider form suction and impact using Part 5 of PCI MNL-120 Design Handbook.
  - e. Lifting Equipment: Of size and capacity to prevent damage to panel.
  - f. Set panels on carefully leveled shims.
  - g. Position, plumb and align true to line, and brace securely.
  - h. Bottom Joint Space: Fill with specified grout(s) as shown and as soon as panels are placed and braced.
  - i. Insert Holes: Fill with non-shrink nonmetallic grout.
  - j. Holes in Exposed Surfaces: Patch to match color and texture of adjacent surfaces.
  - k. Make welded connections.

E. Connect structural precast concrete members in position by bolting, welding, grouting, or as otherwise indicated on approved shop (erection) drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and/or grouting are completed.

- 1. Disruption of roof flashing continuity by connections is not permitted; concealment within roof insulation is acceptable.

- F. Welding: Unless otherwise specified, in accordance with Section 05 05 23, Welding.
  - 1. Protect structural precast concrete members and bearing pads from damage during field welding or cutting operations and provide noncombustible shields as required.
  - 2. Welds not specified shall be continuous fillet welds, using not less than the minimum fillet as specified by AWS D1.1/D1.1M, D1.4/D1.4M or D1.6/D1.6M.
  - 3. Clean-weld-affected metal surfaces with chipping hammer followed by brushing or power tool cleaning and then repair damaged painting or coatings (if any), in accordance with manufacturer's recommendations.
  - 4. Visually check all welds for completion before inspection.
  - 5. Remove and reweld, or repair defective welds.
- G. Fasteners: Do not use drilled or power-actuated fasteners for attaching accessory items to precast, prestressed concrete members unless approved by Precast Engineer and Owner.
- H. Field Cutting: Do not field cut precast, prestressed concrete members unless approved by Precast Engineer and Owner.

### 3.04 ERECTION TOLERANCES

- A. Erect structural precast concrete members level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of ACI ITG-7.
- B. Level out variations between adjacent members by jacking, loading, or other feasible method as recommended by the fabricator and acceptable to the Owner.

### 3.05 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the special inspections prepare reports in accordance with the Statement of Special Inspection.
  - 1. Statement of Special Inspection: See 01-G-Series Drawings for additional information.
  - 2. See Section 01 45 33, Special Inspections, Observations, and Testing for additional information.

B. Other Inspection:

1. With Owner's or Owner's Representative, inspect precast architectural wall panels for chips, cracks, discoloration, and other damage.
2. Compare every panel to approved mockup panel and finish sample panel.
3. Record location and condition of damaged or nonmatching panels.

C. Resolution:

1. Repair damage to satisfaction of Owner.
2. Remove panels with damage or repairs not acceptable to Owner.
3. Install new acceptable panels in place of those removed.
4. Perform reinspection and obtain acceptance by Owner.

3.06 PATCHING

- A. Mix and place patching mixture to match color and texture of surrounding concrete and to minimize shrinkage.
- B. Demonstrate patching method and obtain acceptance and approval.

3.07 CLEANING

- A. After installation, clean soiled precast concrete surfaces with detergent and water, using fiber brush and sponge.
- B. Use acid solution only to clean particularly stubborn stains after more conservative methods have been tried unsuccessfully.
- C. Use extreme care to prevent damage to precast concrete surfaces and to adjacent materials.
- D. Rinse thoroughly with clean water immediately after using cleaner.

3.08 PROTECTION

- A. Protect precast units from chipping, spalling, cracking, or other damage to the units after delivery to Site.
- B. After erection, protect units from damage.

**END OF SECTION**

**SECTION 03 62 00  
GROUTING**

**PART 1 GENERAL**

**1.01 REFERENCES**

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):
  - a. C230, Standard Specification for Flow Table for Use in Tests of Hydraulic Cement.
  - b. C307, Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
  - c. C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
  - d. C579, Standard Test Methods for Compressive Grout Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
  - e. C882, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
  - f. C939, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
  - g. C940, Standard Test Method for Expansion and Bleeding of Freshly Mixed Grouts for Preplaced-Aggregate Concrete in the Laboratory.
  - h. C1107/C1107M, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
  - i. C1181, Standard Test Methods for Compressive Creep of Chemical-Resistant Polymer Machinery Grouts.
  - j. D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

**1.02 SUBMITTALS**

A. Action Submittals:

1. Product data of grouts.
2. Proposed method for keeping existing concrete surfaces wet prior to placing nonshrink grout.
3. Forming method for fluid grout placements.
4. Curing method for grout.

B. Informational Submittals:

1. Manufacturer's Written Instructions: Mixing of grout.
2. Manufacturer's proposed training schedule for grout work.
3. Manufacturer's Certificate of Compliance in accordance with Section 01 61 00, Common Product Requirements.
  - a. Grout free from chlorides and other corrosion-causing chemicals.
  - b. Nonshrink grout properties of Category II and Category III, verifying expansion at 3 days or 14 days will not exceed the 28-day expansion and nonshrink properties are not based on gas or gypsum expansion.
4. Manufacturer's Certificate of Proper Installation.
5. Statements of Qualification: Grout manufacturer's representative.
6. Test Reports:
  - a. Test report for 24-hour evaluation of nonshrink grout.
  - b. Test results and service report from demonstration and training session.
  - c. Field test reports and laboratory test results for field-drawn Samples.
7. List of Contractor's equipment installation staff trained by grout manufacturer's representative in:
  - a. Nonshrink grout installation and curing.
  - b. Epoxy grout installation and curing.

1.03 QUALIFICATIONS

- A. Grout Manufacturer's Representative: Authorized and trained representative of grout manufacturer. Minimum of 1-year experience that has resulted in successful installation of grouts similar to those for this Project.
- B. For grout suppliers not listed herein, provide completed 24-hour Evaluation of Nonshrink Grout Test Form, attached at the end of this section. Provide independent testing laboratory test results for testing conducted within last 18 months.

**PART 2      PRODUCTS****2.01      NONSHRINK GROUT AND EPOXY GROUT SCHEDULE**

- A.      Furnish nonshrink grout (Category I, II, and III) and epoxy grout for applications as indicated in the following schedule:

<b>Application</b>	<b>Temperature Range</b>	<b>Max. Placing Time</b>	
	<b>40 deg F to 100 deg F</b>	<b>20 Min.</b>	<b>Greater Than 20 Min.</b>
Blockouts for gate guides	I or II		II
Precast joints	I or II		II
Column baseplates single-story	I or II		II
Machine bases 25 hp or less	II	II	II
Bases for precast wall sections	II	II	II
Baseplates for columns over one story	II	II	II
Precast base joints higher than one story	II	II	II
Form tie-through bolt openings unless otherwise specified	II	II	II
Machine bases 26 hp and up	III or Epoxy Grout	III or Epoxy Grout	III or Epoxy Grout
Baseplates and/or soleplates with vibration, thermal movement, etc.	III or Epoxy Grout	III or Epoxy Grout	III or Epoxy Grout

## 2.02 NONSHRINK GROUT

### A. Category I:

1. Nonmetallic and nongas-liberating.
2. Prepackaged natural aggregate grout requiring only the addition of water.
3. Test in accordance with ASTM C1107/C1107M:
  - a. Grout shall have flowable consistency.
  - b. Flowable for 15 minutes.
4. Grout shall not bleed at maximum allowed water.
5. Minimum strength of flowable grout, 3,000 psi at 3 days, 5,000 psi at 7 days, and 7,000 psi at 28 days.
6. Manufacturers and Products:
  - a. Master Builders Solutions US, Shakopee, MN; MasterFlow 100.
  - b. Euclid Chemical Co., Cleveland, OH; NS Grout.
  - c. Dayton Superior Corp., Miamisburg, OH; 1107 Advantage Grout.
  - d. US MIX Co., Denver, CO; US SPEC GP Grout.
  - e. Five Star Products Inc., Fairfield, CT; Five Star Grout.

### B. Category II:

1. Nonmetallic, nongas-liberating.
2. Prepackaged natural aggregate grout requiring only the addition of water.
3. Aggregate shall show no segregation or settlement at fluid consistency at specified times or temperatures.
4. Test in accordance with ASTM C1107/C1107M:
  - a. Fluid consistency 20 seconds to 30 seconds in accordance with ASTM C939.
  - b. Temperatures of 40 degrees F, 80 degrees F, and 90 degrees F.
5. 1 hour after mixing, pass fluid grout through flow cone with continuous flow.
6. Minimum strength of fluid grout, 3,500 psi at 1 day, 4,500 psi at 3 days, and 7,500 psi at 28 days.
7. Maintain fluid consistency when mixed in 1-yard to 9-yard loads in ready-mix truck.
8. Manufacturers and Products:
  - a. Master Builders Solutions US, Shakopee, MN; MasterFlow 928.
  - b. Five Star Products Inc., Fairfield, CT; Five Star Fluid Grout 100.
  - c. Euclid Chemical Co., Cleveland, OH; Hi Flow Grout.
  - d. Dayton Superior Corp., Miamisburg, OH; Sure Grip High Performance Grout.
  - e. US MIX Co., Denver, CO; US SPEC MP Grout.



C. Category III:

1. Metallic and nongas-liberating.
2. Prepackaged aggregate grout requiring only the addition of water.
3. Aggregate shall show no segregation or settlement at fluid consistency at specified times or temperatures.
4. Test in accordance with ASTM C1107/C1107M:
  - a. Fluid consistency 20 seconds to 30 seconds in accordance with ASTM C939.
  - b. Temperatures of 40 degrees F and 100 degrees F.
5. 1 hour after mixing, pass fluid grout through flow cone with continuous flow.
6. Minimum strength of fluid grout, 4,000 psi at 1 day, 5,000 psi at 3 days, and 9,000 psi at 28 days.
7. Maintain fluid consistency when mixed in 1-yard to 9-yard loads in ready-mix truck.
8. Manufacturer and Product:
  - a. Master Builders Solutions US, Shakopee, MN; MasterFlow 885.
  - b. Euclid Chemical Co, Cleveland, OH; Hi-Flow Metallic Grout.

2.03 EPOXY GROUT

- A. High-strength, nonshrink, high-temperature epoxy grouting material developed for the support of heavy equipment with vibratory loads.
- B. Three-component mixture of a two-component epoxy resin system (100 percent solids) with a graded, precision aggregate blend.
- C. Premeasured, prepackaged system.
- D. Flowable.
- E. Minimum compressive strength in accordance with ASTM C579 Method B, 9,500 psi at 75 degrees F at 7 days, 11,000 psi at post cure.
- F. Maximum creep resistance in accordance with ASTM C1181 at 600 psi, 140 degrees F;  $6.0 \times 10^{-3}$  in/in.
- G. Minimum bond strength in accordance with ASTM C882, 2,000 psi.
- H. Minimum tensile strength in accordance with ASTM C307, 2,000 psi.

- I. Maximum coefficient of thermal expansion in accordance with ASTM C531 at 73 degrees F to 210 degrees F, 23.0 by  $10^{-6}$  in/in/degrees F.
- J. Working Time: Minimum 2 hours at 50 degrees F; 1.5 hours at 70 degrees F; 50 minutes at 90 degrees F.
- K. Good chemical resistance.
- L. Good effective bearing area.
- M. Noncorrosive.
- N. Moisture insensitive.
- O. Modify resin and aggregate content where recommended by epoxy grout manufacturer to provide desired epoxy grout flow properties.
- P. Manufacturer and Product:
  - 1. Master Builders Solutions US, Shakopee MN; MasterFlow 648.
  - 2. Euclid Chemical Co., Cleveland, OH; E<sup>3</sup>-G.
  - 3. Dayton Superior Corp., Miamisburg, OH; Pro-Poxy 2000 Normal Set.
  - 4. Five Star Products Inc., Fairfield, CT; DP Epoxy Grout.

### **PART 3 EXECUTION**

#### **3.01 GROUT**

- A. General: Mix, place, and cure grout in accordance with grout manufacturer's representative's training instructions.
- B. Epoxy Grout: Concrete slab shall be fully cured for 28 days to ensure excess water has evaporated. Test concrete surface for moisture in accordance with ASTM D4263 before epoxy grout is placed.
- C. Form Tie-Through Bolt Holes: Provide nonshrink grout, Category II, fill space with dry pack dense grout hammered in with steel tool and hammer. Through-bolt holes; coordinate dry pack dense grout application with vinyl plug in Section 03 10 00, Concrete Forming and Accessories, and bonding agent in Section 03 30 00, Cast-in-Place Concrete.
- D. Form Snap-Tie Hole: Fill tie hole in accordance with requirements of Section 03 30 00, Cast-in-Place Concrete.

### 3.02 GROUTING MACHINERY FOUNDATIONS

- A. Block out original concrete or finish off at distance shown below bottom of machinery base with grout. Prepare concrete surface by sandblasting, chipping, or by mechanical means to remove any soft material. Surface roughness in accordance with manufacturer's written instructions.
- B. Clean metal surfaces of all paint, oil, grease, loose rust, and other foreign material that will be in contact with grout.
- C. Sandblast to bright metal all metal surfaces in contact with epoxy grout in accordance with manufacturer's written instructions.
- D. Set machinery in position and wedge to elevation with steel wedges, or use cast-in leveling bolts. Remove wedges after grout is set and pack void with grout.
- E. Form with watertight forms at least 2 inches higher than bottom of plate.
- F. Fill space between bottom of machinery base and original concrete in accordance with manufacturer's representative's training instructions.
- G. If grout cannot be placed from one edge and flowed to the opposite edge, air vents shall be provided through the plate to prevent air entrapment.
- H. Radius all corners of grout pad.
- I. Install expansion joints for epoxy grout placement in accordance with manufacturer's written instructions.

### 3.03 TANK FOUNDATIONS

- A. Prepare concrete surface by sandblasting, chipping, or by mechanical means to remove any soft material. Surface roughness in accordance with manufacturer's written instructions.
- B. Clean metal surfaces of all paint, oil, grease, loose rust and other foreign material that will be in contact with grout.
- C. Set tank in position and wedge to elevation with steel wedges, or use cast-in leveling bolts. Remove wedges after grout is set and pack void with grout.
- D. Form with watertight forms at least 2 inches higher than bottom of plate.
- E. Fill space between bottom of tank base and original concrete in accordance with manufacturer's representative's training instructions.

### 3.04 FIELD QUALITY CONTROL

#### A. General:

1. Performed by Project representative's inspection staff.
2. Perform the following quality control inspections. The grout manufacturer's representative shall accompany the Project representative's inspection staff on the first installation of each size and type of equipment.

#### B. Evaluation and Acceptance of Nonshrink Grout:

1. Inspect the surface preparation of concrete substrates onto which nonshrink grout materials are to be applied, for conformance to the specified application criteria including, but not limited to, substrate profile, degree of cleanliness, and moisture.
2. Inspect preparation and application of nonshrink grout form work for conformance to the manufacturer's recommendations.
3. Conduct a final review of completed nonshrink grout installation for conformance to these Specifications.
4. Provide a flow cone and cube molds with restraining plates onsite. Continue tests during Project as demonstrated by grout manufacturer's representative.
5. Perform flow cone and bleed tests, and make three 2-inch by 2-inch cubes for each 25 cubic feet of each type of nonshrink grout used. Use restraining caps for cube molds in accordance with ASTM C1107/C1107M.
6. For large grout applications, make three additional cubes and one more flow cone test. Include bleed test for each additional 25 cubic feet of nonshrink grout placed.
7. Consistency: As specified in Article Nonshrink Grout. Flow cone test in accordance with ASTM C939. Grout with consistencies outside range requirements shall be rejected.
8. Segregation: As specified in Article Nonshrink Grout. Grout when aggregate separates shall be rejected.
9. Nonshrink grout cubes shall test equal to or greater than minimum strength specified.
10. Strength Test Failures: Nonshrink grout work failing strength tests shall be removed and replaced.
11. Perform bleeding test in accordance with ASTM C940 to demonstrate grout will not bleed.

12. Store cubes at 70 degrees F.
13. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with ASTM C1107/C1107M.
14. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

C. Evaluation and Acceptance of Epoxy Grout:

1. Inspect ambient conditions during various phases of epoxy grouting installation for conformance with the epoxy grout manufacturer's requirements.
2. Inspect the surface preparation of concrete substrates onto which epoxy grout materials are to be applied, for conformance to the specified application criteria including, but not limited to, substrate profile, degree of cleanliness, and moisture.
3. Inspect the surface preparation of the metallic substrates onto which the epoxy primer is to be applied.
4. Inspect the epoxy-primed metallic substrate for coverage and adhesion.
5. Inspect preparation and application of epoxy grout form work for conformance to the manufacturer's recommendation.
6. Verify consistency obtained is sufficient for the proper field placement at the installed temperatures.
7. Inspect and record that the "pot life" of epoxy grout materials is not exceeded during the installation.
8. Inspect epoxy grout for cure.
9. Inspect and record that localized repairs made to grout voids are in conformance with the specification requirements.
10. Conduct a final review of completed epoxy grout installation for conformance to these Specifications.
11. Compression tests and fabrication of specimens for epoxy grout shall be made in accordance to ASTM C579, Method B, at intervals during construction as selected by the Project representative. A set of three specimens shall be made for testing at 7 days, and each earlier time period as appropriate.
12. Independent testing laboratory shall prepare, store, cure, and test cubes in accordance with ASTM C579.
13. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

### 3.05 MANUFACTURER'S SERVICES

#### A. General:

1. Coordinate demonstrations, training sessions, and applicable Site visits with grout manufacturer's representative. Allow 2-week notice to grout manufacturer's representative for scheduling purposes.
2. Provide and conduct onsite, demonstration and training sessions for bleed tests, mixing, flow cone measurement, cube testing, application, and curing for each category and type of grout.
3. Necessary equipment and materials shall be available for demonstration.
4. Conduct training prior to equipment mount installation work on equipment pads.
5. Training for each type of grout shall be not less than 4 hours' duration.

#### B. Nonshrink Grout Training:

1. Training is required for all Type II and Type III grout installations.
2. Provide nonshrink grout installation training by the qualified grout manufacturer's representative for Contractor's workers that will be installing nonshrink grout for baseplates and equipment mounts. Schedule training to allow Engineer's attendance.
3. Mix nonshrink grouts to required consistency, test, place, and cure on actual Project, such as, baseplates and form tie-through bolt holes to provide actual on-the-job training.
4. Use minimum of two bags for each grout Category II and Category III. Mix grout to fluid consistency and conduct flow cone and two bleed tests, make a minimum of six cubes for testing of two cubes at 1 day, 3 days, and 28 days. Use remaining grout for final Work.
5. Include recommended grout curing methods in the training.
6. Mix and demonstrate patching through-bolt holes and blockouts for gate guides, and similar items.
7. Transport test cubes to independent test laboratory and obtain test reports.
8. Training by manufacturer's representative does not relieve Contractor of overall responsibility for this portion of the work.
9. Submit a list of attendees that have been satisfactorily trained to perform epoxy grout installation for equipment mounting.

C. Epoxy Grout Training:

1. Provide epoxy grout installation training by the qualified epoxy grout manufacturer's representative for Contractor's workers that will be installing epoxy grout for equipment mounts. Schedule training to allow Engineer's attendance.
2. Include training in:
  - a. Performance testing such as compressive strength testing of the epoxy grout.
  - b. All aspects of using the products, from mixing to application.
3. Transport test cubes to independent test laboratory and obtain test reports.
4. Training by manufacturer's representative does not relieve Contractor of overall responsibility for this portion of the work.
5. Submit a list of attendees that have been satisfactorily trained to perform epoxy grout installation for equipment mounting.

3.06 SUPPLEMENTS

- A. The supplement listed below, following "End of Section," is part of this Specification.
  1. 24-hour Evaluation of Nonshrink Grout Test Form and Grout Testing Procedures.

**END OF SECTION**





## SUPPLEMENT 1

\_\_\_\_\_  
(Test Lab Name)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Phone No.)

### 24-HOUR EVALUATION OF NONSHRINK GROUT TEST FORM

OBJECTIVE: Define standard set of test procedures for an independent testing laboratory to perform and complete within a 24-hour period.

SCOPE: Utilize test procedures providing 24-hour results to duplicate field grouting demands. Intent of evaluation is to establish grout manufacturer's qualifications.

PRIOR TO TEST: Obtain three bags of each type of grout.

1. From intended grout supplier for Project.
2. Three bags of grout shall be of same lot number.

ANSWER THE FOLLOWING QUESTIONS FOR GROUT BEING TESTED FROM LITERATURE, DATA, AND PRINTING ON BAG:

- A. Product data and warranty information contained in company literature and data? Yes\_\_\_\_\_ No\_\_\_\_\_
- B. Literature and bag information meet specified requirements? Yes\_\_\_\_\_ No\_\_\_\_\_
- C. Manufacturer guarantees grout as specified in Article Guarantee? Yes\_\_\_\_\_ No\_\_\_\_\_
- D. Guarantee extends beyond grout replacement value and allows participation with Contractor in replacing and repairing defective areas? Yes\_\_\_\_\_ No\_\_\_\_\_
- E. Water demands and limits printed on bag? Yes\_\_\_\_\_ No\_\_\_\_\_
- F. Mixing information printed on the bag? Yes\_\_\_\_\_ No\_\_\_\_\_
- G. Temperature restrictions printed on bag? Yes\_\_\_\_\_ No\_\_\_\_\_

\*Rejection of a grout will occur if one or more answers are noted NO.

## GROUT TESTING PROCEDURES

A. Bagged Material:

1. List lot numbers. \_\_\_\_\_
2. List expiration date. \_\_\_\_\_
3. Weigh bags and record weight. \_\_\_\_\_

Owner's Representative will disqualify grout if bag weights have misstated measure plus or minus 2 pounds by more than one out of three bags. (Accuracy of weights is required to regulate amount of water used in mixing since this will affect properties.)

B. Mixing and Consistency Determination:

1. Mix full bag of grout in 10-gallon pail.
2. Use electric drill with a paddle device to mix grout (jiffy or jiffler type paddle).
3. Use maximum water allowed per water requirements listed in bag instructions.
4. Mix grout to maximum time listed on bag instructions.
5. In accordance with ASTM C939 (flow cone) determine time of mixed grout through the flow cone. \_\_\_\_\_ seconds
6. Add water to attain 20- to 30-second flow in accordance with ASTM C939.
7. Record time of grout through cone at new water demand. \_\_\_\_\_ seconds
8. Record total water needed to attain 20- to 30-second flow. \_\_\_\_\_ pounds
9. Record percent of water. \_\_\_\_\_ percent

C. When fluid grout is specified and additional water is required beyond grout manufacturer's listed maximum water, ASTM C1107/C1107M will be run at new water per grout ratio to determine whether grout passes using actual water requirements to be fluid. Use new water per grout ratio on remaining tests.

D. Bleed Test:

1. Fill two gallon cans half full of freshly mixed grout at ambient temperatures for each category and at required consistency for each.
2. Place one can of grout in tub of ice water and leave one can at ambient temperature.
3. Cover top of both cans with glass or plastic plate preventing evaporation.
4. Maintain 38 degrees F to 42 degrees F temperature with grout placed in ice and maintain ambient temperature for second container for 1 hour.

5. Visually check for bleeding of water at 15-minute intervals for 2 hours.
6. Perform final observation at 24 hours.

If grout bleeds a small amount at temperatures specified, grout will be rejected.

E. Extended Flow Time and Segregation Test (for Category II and Category III):

1. Divide the remaining grout into two 3-gallon cans. Place the cans into the 40-degree F and 90-degree F containers and leave for 20, 40, and 60 minutes. Every 20 minutes remove and check for segregation or settlement of aggregate. Use a gloved hand to reach to the bottom of the can, if more than 1/4 inch of aggregate has settled to the bottom or aggregate has segregated into clumps reject the grout.
2. Right after the settlement test mix the grout with the drill mixer for 10 seconds. Take a ASTM C939 flow cone test of grout and record flow time. Maintain this process for 1 hour at ambient temperatures of 40 degrees F and 90 degrees F.
  - a. 20 min \_\_\_\_\_, sec. @ 40 degrees F.
  - b. 40 min \_\_\_\_\_, sec. @ 40 degrees F.
  - c. 60 min \_\_\_\_\_, sec. @ 40 degrees F.
  - d. 20 min \_\_\_\_\_, sec. @ 90 degrees F.
  - e. 40 min \_\_\_\_\_, sec. @ 90 degrees F.
  - f. 60 min \_\_\_\_\_, sec. @ 90 degrees F.

All Category II and Category III grout that will not go through the flow cone with continuous flow after 60 minutes will be disqualified.

\_\_\_\_\_  
Qualified

\_\_\_\_\_  
Disqualified

F. 24-hour Strength Test:

1. Using grout left in mixing cans in accordance with ASTM C1107/C1107M for mixing and consistency determination test and for extended time flow test, make minimum of nine cube samples.
2. Store cubes at 70 degrees F for 24 hours.
3. Record average compressive strength of nine cubes at 24 hours.

Grout will be disqualified if 24-hour compressive strengths are less than 2,500 psi for grouts claiming fluid placement capabilities.

Grouts that have not been disqualified after these tests are qualified for use on the Project for the application indicated in Nonshrink Grout Schedule.

\_\_\_\_\_  
Signature of Independent Testing Laboratory

\_\_\_\_\_  
Date Test Conducted



**SECTION 03 63 00  
CONCRETE DOWELING**

**PART 1 GENERAL**

**1.01 REFERENCES**

- A. The following is a list of standards that may be referenced in this section:
  - 1. American National Standards Institute (ANSI).
  - 2. ASTM International (ASTM):
    - a. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
    - b. E488, Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
  - 3. International Code Council (ICC):
    - a. 2015 International Building Code (IBC).
    - b. Evaluation Services Reports.

**1.02 DEFINITIONS**

- A. ICC Evaluation Services Report: Published by ICC for products provided by concrete adhesive anchor manufacturers.
- B. Special Inspection: As defined in the ICC IBC and indicated on the Statement of Special Inspection (Plan) on the Drawings.

**1.03 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: Manufacturer's catalog information.
- B. Informational Submittals:
  - 1. Manufacturer's instructions for preparation, placement, drilling of holes, installation of anchors and adhesive, and handling of cartridges, nozzles, and equipment.
  - 2. Manufacturer's written letter of certification identifying installer's qualifications to install products.
  - 3. ICC Evaluation Services Report: Specific to proposed doweling system manufacturer.

1.04 QUALITY ASSURANCE

- A. Qualifications: Installer: Trained and certified by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Container Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
- B. Store adhesive components in accordance with manufacturer's written instructions.
- C. Dispose of when:
  - 1. Shelf life has expired.
  - 2. Stored other than per manufacturer's instructions.

**PART 2 PRODUCTS**

2.01 MATERIALS

- A. Adhesive:
  - 1. Approved by an ICC Evaluation Services Report for conformance to 2015 IBC requirements for doweling of steel reinforcing bars in cracked concrete.
  - 2. Suitable for long-term loads as well as for wind and seismic loads.
  - 3. Meet requirements of ASTM C881/C881M.
  - 4. Two-component, insensitive to moisture, designed to be used in adverse freeze/thaw environments.
  - 5. Disposable, Self-Contained Cartridge System:
    - a. Capable of dispensing both components in proper mixing ratio.
    - b. Fit into manually or pneumatically operated caulking gun.
  - 6. Mixed Adhesive: Nonsag, light paste consistency with ability to remain in a 1-inch diameter overhead drilled hole without runout.
  - 7. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions.
  - 8. Manufacturers and Products:
    - a. Hilti, Inc., Tulsa, OK; HIT Doweling Anchor System, HIT RE 500 V3 (ESR-3814).
    - b. Simpson Strong-Tie Co., Inc., Pleasanton, CA; SET-3G Epoxy Adhesive Anchors. (ESR-4057).

- B. Mixing Nozzles: Disposable, manufactured in several sizes to accommodate size of reinforcing dowels.
- C. Reinforcing Dowels: As specified in Section 03 21 00, Steel Reinforcement.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Drilling Equipment:
  - 1. Drilling Hammers for Dowel Holes:
    - a. Electric or pneumatic rotary type with medium or light impact.
    - b. Hollow drills with flushing air systems are preferred.
  - 2. Where edge distances are less than 2 inches, use lighter impact equipment to prevent microcracking and concrete spalling during drilling process.
- B. Hole Diameter: Use drill bit diameter meeting ICC Evaluation Services Report requirements and as recommended by manufacturer.
- C. Obstructions in Drill Path: When existing steel reinforcement is encountered during drilling, obtain Engineer approval for proposed fix.
- D. Doweling:
  - 1. Install per details shown on Drawings and in accordance with adhesive manufacturer's instructions.
  - 2. When using epoxy anchors, dowels may be prebent prior to installation to 15 degrees to align with other bars. Do not heat dowels to bend.
  - 3. Bent Bar Dowels: Where edge distances are critical, and intersection with steel reinforcement or other obstruction is likely, slant drill to address edge distance or to clear obstruction. If drill must be slanted more than indicated in the manufacturer's installation instructions to clear obstruction, notify Engineer for direction on how to proceed.
- E. Adhesive:
  - 1. Install in accordance with written manufacturer's instructions.
  - 2. Dispense components through specially designed static mixing nozzle that thoroughly mixes components and places mixed adhesive at base of predrilled hole.

### 3.02 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

#### A. Proof Loading:

1. To be performed where continuous inspection of concrete dowels is required.
2. Testing will be performed by Owner's Independent Testing Agency.
3. Proof loading to be performed only after adhesive has achieved proper cure per manufacturer's requirements.
4. Testing will be conducted on minimum of 10 percent of installed dowels, with a minimum of two tension tests for each detailed or specified condition at each facility. A minimum of two cartridges per box or packaging unit will be tested.
5. Testing will be conducted in accordance with ASTM E488 and as follows:
  - a. Performance of a static tension test of each test dowel.
  - b. Test apparatus reaction base will not interfere with bond failure of dowel, but will preclude a concrete pullout cone failure.
  - c. Each test dowel will be tested at a proof load equal to the lesser of 80 percent of the yield strength of the dowel bar or 50 percent of calculated ultimate load based on adhesive bond strength.
  - d. Test load to be maintained for a minimum of 30 seconds without visible signs of movement of dowel or drop in gauge reading.
6. Failure of dowel bar or failure within base concrete will cause dowel to be rejected. For each rejected dowel, two additional dowels will be tested. Replace rejected dowels as approved by Owner.

#### B. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspection (Plan) on Drawings. Contractor responsibilities and related information on special inspection and testing are included in Section 01 45 33, Special Inspection, Observation, and Testing.

1. Special inspection will be performed by the Special Inspector in accordance with ICC ESR requirements and as specified in Section 01 45 33, Special Inspection, Observation, and Testing.
2. Continuous inspection required where noted on Drawings herein and where concrete dowels are installed in overhead applications.
3. Periodic inspection required where continuous inspection is not specified.



4. Special Inspector will observe installation in accordance with requirements of the ICC Evaluation Services Report and will submit report including the following:
    - a. Product Description: Product name, rod diameter, and length.
    - b. Drill bit compliance.
    - c. Hole diameter, diameter, and depth and cleanliness.
    - d. Adhesive expiration date.
  5. Verification of dowel installation in accordance with manufacturer's published instructions.
- C. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

**END OF SECTION**



**SECTION 03 64 23**  
**EPOXY RESIN INJECTION GROUTING**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    ASTM International (ASTM):
    - a.    C882, Standard Specification for Test Method for Bond Strength of Epoxy Resin System Used with Concrete by Slant Shear.
    - b.    D570, Standard Test Method for Water Absorption of Plastics.
    - c.    D638, Standard Test Method for Tensile Properties of Plastics.
    - d.    D648, Standard Test Method for Deflection Temperature of Plastics under Flexural Load in the Edgewise Position.
    - e.    D695, Standard Test Method for Compressive Properties of Rigid Plastics.
    - f.    D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  2.    National Sanitation Foundation (NSF):
    - a.    Standard 60, Standard for Drinking Water Treatment and Chemicals – Health Effects.
    - b.    Standard 61, Standard for Drinking Water System Components – Health Effects.

**1.02      DEFINITIONS**

- A.    Crack: Complete or incomplete separation of concrete into two or more parts produced by breaking or fracturing.
- B.    Defective Area: As defined in Section 03 30 00, Cast-in-Place Concrete.
- C.    Hydraulic Structure: Liquid containment structure and/or structure designed to mitigate liquid infiltration.
- D.    Injection: Method of bonding together, addressing or eliminating leakage through cracks or joints by installing resin under pressure to fill the void in crack or joint.

- E. Joint: A planned and formed discontinuity in concrete structure at junction of adjacent and sequential concrete placements and may contain embedded waterstops.
- F. Leak or Leakage: Crack or joint exhibiting presence of moisture, sign of efflorescence, intermittently wet to touch, or continuous flow of liquid.
- G. Narrow Cracks: Width equal to or less than 0.015 inch.
- H. Wide Cracks: Wider than 0.015 inch.

### 1.03 SUBMITTALS

#### A. Action Submittals:

- 1. Physical and chemical properties for epoxy resin.
- 2. Technical data for metering, mixing, and injection equipment.
- 3. Depth of penetration, length, material used, and procedures where epoxy is approved for use.
- 4. Marked up drawings of proposed epoxy injection repair crack locations, widths, and lengths and direction on structure.
- 5. Sample bottle.
- 6. Pot Life Test.
- 7. Slant Shear Test (Bond Strength).

#### B. Informational Submittals:

- 1. Manufacturer's recommended surface preparation procedures and application instructions for epoxy resins.
- 2. Manufacturer's Certificate of Compliance in accordance with Section 01 61 00, Common Product Requirements. Certified test results for each batch of epoxy resin.
- 3. Statements of Qualification for Epoxy Resin:
  - a. Manufacturer's Site representative.
  - b. Injection applicator.
  - c. Injection pump operating technician.

## 1.04 QUALITY ASSURANCE

### A. Qualifications for Injection Staffs:

1. Manufacturer's Site Representative:
  - a. Capable of instructing successful methods of epoxy injection process for concrete structure.
  - b. Understands and is capable of explaining technical aspects of correct material selection and use.
  - c. Experienced in operation, maintenance, and troubleshooting of application equipment.
2. Injection Crew and Job Foreman:
  - a. Provide written and verifiable evidence showing compliance with the following requirements:
    - 1) Licensed or certified by epoxy resin material manufacturer.
    - 2) Minimum 3 years' experience in successful epoxy injection for at least 10,000 linear feet of successful crack injection, including 2,000 linear feet of wet crack injection to stop water leakage.

B. Injected Epoxy Resin: Fill cracks with minimum resin depth penetration no less than 90 percent of full thickness of concrete section for cracks.

C. Injected cracks which leak shall be considered deficient work irrespective of depth of penetration. Reinjection of deficient work or, with approval of Engineer, provide other repairs to eliminate leakage.

## 1.05 DELIVERY, STORAGE, AND HANDLING

### A. Packing and Shipping:

1. Package resin material in new sealed containers and label with following information:
  - a. Manufacturer's name.
  - b. Product name and lot number.
  - c. ANSI Hazard Classification.
  - d. ANSI recommended precautions for handling.
  - e. Mix ratio by volume for components.

B. Storage and Protection: Store epoxy resin material containers in accordance with manufacturer's printed instructions and at ambient temperatures below 110 degrees F and above 45 degrees F.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Materials and accessories specified in this section shall be products of:
1. Master Builders Solutions US, Shakopee, MN; SCB Concrese Series products that meet properties indicated in sub-section 2.2.B.
  2. Sika Corp., Lyndhurst, NJ; Sikadur Series products that meet properties below.
  3. Euclid Chemical Co., Cleveland, OH; Euco Series (#452) products that meet properties below.

### 2.02 EPOXY INJECTION RESIN

- A. Two-component A and B structural epoxy resin for injection into cracks or other voids in concrete structures for bonding or grouting.
- B. Uncured Resin Properties:

1. When mixed in ratio specified on resin container label:

	Test Method	Wide Cracks	Narrow Cracks
Pot Life (60-gram mass) @ 77, plus or minus 4 deg F	As specified in Article Source Quality Control	13 to 25 minutes	15 to 30 minutes
Pot Life (60-gram mass) @ 100, plus or minus 4 deg F	As specified in Article Source Quality Control	3 to 10 minutes	10 to 20 minutes
Viscosity @ 40, plus or minus 3 deg F	Brookfield RVT Spindle No. 4 @ 20 rpm	4,400 cps	600 cps
Viscosity @ 75 to 77 deg F	Brookfield RVT Spindle No. 2 @ 20 rpm	375 to 350 cps	175 to 140 cps

- C. Epoxy Resin Properties: When cured for 7 days at 77 degree F, plus or minus 3 degrees F and conditioned at test temperature 12 hours prior to test, unless otherwise specified.

	Test Method	Wide Cracks or Joints	Narrow Cracks or Joints
Ultimate Tensile Strength, psi	ASTM D368	8,000 min.	5,000 min.
Tensile Elongation @ Break, percent	ASTM D638	4.2 max.	3.0 max.

	<b>Test Method</b>	<b>Wide Cracks or Joints</b>	<b>Narrow Cracks or Joints</b>
Flexural Strength, psi	ASTM D790	10,000 min.	10,000 min.
Flexural Modulus, psi	ASTM D790	5.5 x 10 <sup>5</sup> min.	4.5x10 <sup>5</sup> min.
Compressive Yield Strength, psi	ASTM D695*	15,000 min.	12,000 min.
Compressive Modulus, psi	ASTM D695*	4.0x10 <sup>5</sup> min.	4.0x10 <sup>5</sup> min.
Heat Deflection Temperature	ASTM D648*	130 deg F min.	140 deg F min.
Cured 3 days @ 40 deg F – Wet Concrete		3,500 psi min.	3,500 psi min.
Cured 1 day @ 77 deg F – Dry Concrete		5,000 psi min.	5,000 psi min.
Cured 3 days @ 77 deg plus or minus 3 deg F		5,000 psi min.	5,000 psi min.
*Cure test specimens so that peak exothermic temperature of resin does not exceed 100 degrees F.			
Note: See referenced specifications for preparation method of test specimens.			

### 2.03 SURFACE SEAL

- A. Sufficient strength and adhesion for holding injection fittings firmly in place and to resist pressures preventing leakage during injection.
- B. Capable of removal after injection resin has cured.

### 2.04 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards.

### 2.05 SAMPLE BOTTLE

- A. Five-inch natural wide mouth HDPE bottle or 4-ounce clear PVC cylinder bottle; supplied with caps.

### 2.06 SOURCE QUALITY CONTROL

- A. Test Requirements: Perform tests for each batch of epoxy resin.

B. Pot Life Test:

1. Condition Component A and Component B to required temperature.
2. Measure components in ratio of Component B as stated on manufacturer's label into an 8-fluid ounce paper cup.
3. Mix components for 60 seconds using non-metallic stirring instrument. Scrape sides and bottom of cup periodically.
4. Probe mixture once with non-metallic stirring instrument every 30 seconds, starting 2 minutes prior to minimum specified pot life.
5. Pot Life Definition: Time at which a soft stringy mass forms in center of cup.

C. Slant Shear Test: Prepare specimens and perform tests in accordance with ASTM C882.

**PART 3 EXECUTION**

3.01 GENERAL

- A. Unless permitted otherwise, structurally repair cracks listed below: Cracks considered to be defective as defined in Section 03 30 00, Cast-in-Place Concrete.
- B. Do not proceed with injection work until submittals have been reviewed and approved by Engineer.
- C. Perform crack injection work after removing defective surface materials and after performing surface preparation, but prior to applying surface repair material unless otherwise noted. See Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces, and Section 03 01 33, Repair of Horizontal Concrete Surfaces, for concrete surface repair system.
- D. Width of cracks may vary along length and through thickness of concrete section.
- E. Remove all excess, unused epoxy resin materials on concrete surfaces exposed to view prior to end of Work.

3.02 EQUIPMENT

- A. Portable, positive displacement type pumps with in-line metering to meter and mix two epoxy resin components and inject mixture into cracks or joints.



- B. Pumps:
  - 1. Electric or air powered with interlocks providing positive ratio control of proportions for the two components at nozzle.
  - 2. Primary injection pumps for each material of different mix ratio, including a standby backup pump of similar ratio.
  - 3. Capable of immediate compensation for changes in resins.
  - 4. Do not use batch mix pumps.
- C. Discharge Pressure: Automatic pressure controls capable of discharging mixed epoxy resin at pressures in accordance with epoxy resin manufacturer's printed instruction and able to maintain pressure.
- D. Automatic Shutoff Control: Provide sensors on both Component A and Component B reservoirs for stopping machine automatically when only one component is being pumped to mixing head.
- E. Proportioning Ratio Tolerance: Maintain epoxy resin manufacturer's prescribed mix ratio within a tolerance of plus or minus 5 percent by volume at discharge pressure up to 160 psi.
- F. Ratio/Pressure Check Device:
  - 1. Two independent valve nozzles capable of controlling flow rate and pressure by opening or closing valve to restrict material flow.
  - 2. Pressure gauge capable of sensing pressure behind each valve.

### 3.03 PREPARATION

- A. Free cracks from loose matter, dirt, laitance, oil, grease, efflorescence, salt, and other contaminants.
- B. Clean cracks in accordance with epoxy resin manufacturer's instructions.
- C. Clean surfaces adjacent to cracks from dirt, dust, grease, oil, efflorescence, and other foreign matter detrimental to bond of surface seal system and to expose the full extent of cracks and joints in accordance with manufacturer's printed instruction.
- D. Do not use acids and corrosives for cleaning, other than those specified herein unless neutralized prior to injecting epoxy resin.

- E. During installation and curing of materials, if ambient temperature is expected to drop below manufacturer's recommended minimum temperature, provide enclosures and heat as required.
- F. Provide work platforms as required.
- G. Dry out cracks or joints if required by manufacturer's instructions.

### 3.04 APPLICATION

- A. All liquid is to be removed from hydraulic structure prior to commencing with epoxy injection, unless approved otherwise.
- B. Entry Ports:
  - 1. Establish openings for epoxy resin entry in surface seal along crack.
  - 2. Determine space between entry ports equal to thickness of concrete member to allow epoxy resin to penetrate to the full thickness of the member.
  - 3. Drill injection holes at an angle between 45 degrees and 60 degrees from surface of concrete and perpendicular to alignment of cracks , to intersect crack at midpoint of concrete section, except as noted otherwise.
  - 4. Locate drill holes on alternate sides of crack where possible, unless orientation of crack is known or has been verified by non-destructive testing techniques or core drilling.
  - 5. Drill Hole Spacing: Do not to exceed concrete thicknesses or 12 inches maximum, except as noted otherwise.
  - 6. Adjust location and angle of drill holes to suit orientation of crack and at commencement of drilling holes for injection.
  - 7. Take measures to prevent drilling holes for injection too shallow or too deep.
  - 8. Remove dust and debris in drill holes and on surface of structure resulting from drilling operation, by flushing with water prior to installing the injection packers or ports.
  - 9. Space entry ports closer together to allow adjustment of injection pressure to obtain minimum loss of epoxy to soil at locations where:
    - a. Cracks or joints extend entirely through concrete element.
    - b. Backfill of walls on one side.
    - c. Slab-on-grade.
    - d. Difficult to excavate behind wall to seal both surfaces of crack.

10. Install injection packers or ports in drill holes in accordance with manufacturer's printed instructions with zerk coupling or other one-way ball or check valve.
11. Submit in-field health and safety plan for acid flushing operation. As a minimum, identify worker conducting acid flushing by wearing a reflective safety vest and signs indicating "Acid Flushing". Also, clearly identify Work area where acid flushing is underway by signs and isolate by placing orange pylons or other temporary barrier, and signs indicating "Acid Flushing". As work progresses, move pylons or barriers and signs to maintain a safe zone.

C. Application of Surface Seal along Cracks:

1. Apply surface seal in accordance with manufacturer's instructions to designated cracks face prior to injection. Seal surface of cracks to contain and prevent escape of injection epoxy.
2. Cure surface seal in accordance with manufacturer's printed instructions before commencing inject work.

D. Epoxy Injection:

1. Ensure zerk coupling is not installed in ports or packers next to the one being injected.
2. Start injection into each crack at lowest elevation entry port or packer along vertical or diagonal crack, and at one end of horizontal crack.
3. Where injection entry ports or packers are used, continue injection at first port or packer until resin begins to flow out of port or packer at next highest elevation. Plug first port or packer and start injection at second port or packer until resin flows from next port or packer.
4. Inject entire crack with same sequence.
5. At no time inject more than 6 feet length of first vertical crack before verifying resin in sample bottle has start to set and cure.
6. Prior to commencing injection work along a horizontal crack in structure when processed using ports or packers with zerk couplings are used, remove zerk couplings from injection ports or packers except for two ports or packers located where injection work will commence. Commence injection work in first two ports or packers. Once clean resin is vented from third injection port or packer, cease injection at first port or packer, and install zerk coupling and commence injection at third port or packer. Repeat process for fourth and subsequent ports or packers until full length of crack has been injected.

E. Finishing:

1. Allow epoxy resin to cure in accordance with manufacturer's instruction after cracks have been completely injected to allow surface seal removal without draining or runback of uncured epoxy resin material from cracks.
2. Remove surface seal and injection packers and ports from cured injection resin along crack.
3. Finish crack faces flush with adjacent concrete.
4. Indentations or protrusions caused by placement of entry ports, packers, drill holes, or damage from removal of surface seal is not acceptable.
5. Grind off protrusions and patch indentations and holes from injection packers and entry ports with a suitable patch material to satisfaction of Engineer.
6. Remove surplus surface seal material splatters and injection resin material runs and spills from concrete surfaces.

3.05 FIELD QUALITY CONTROL

A. Bottled Sample Tests:

1. During injection operation, provide at least one sample of mixed epoxy resin for each injection pump per shift per injection work day in a sample bottle.
2. Provide sufficient sample to demonstrate sample material epoxy resin will set and cure correctly.
3. Label each bottled sample with Contractor's name, date, and time sample was taken, and location in structure where sample was taken. Record details of bottle sample tests.
4. Place filled sample bottle upright in a container and allow sample to cure.
5. After sample has been allowed to cure, cut bottled sample open and visually inspect contents to verify that epoxy resin material has completely reacted and cured.
6. Evaluation and Assessment of Test:
  - a. Should bottled sample(s) indicate a problem; such as epoxy resin not cured or foreign liquid in sample bottle, take verifying core sample immediately from cracks, where material was used.

- b. Should above-referenced bottle sample(s) and core sample(s) indicate a problem with epoxy resin, arrange to have a Technical Representative of the epoxy resin manufacturer come to Site to review bottled sample(s) and core drilled sample(s) with Engineer and provide technical advice on corrective measures.
- c. Carry out further investigation work or corrective measures recommended by Technical Representative of epoxy resin manufacturer.

**END OF SECTION**



**SECTION 04 22 00  
CONCRETE UNIT MASONRY**

**PART 1      GENERAL**

**1.01      REFERENCES**

A.    The following is a list of standards which may be referenced in this section:

1.    ASTM International (ASTM):
  - a.    A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - b.    A1064/A82M, Standard Specification for Carbon-Steel Wire, and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
  - c.    C33, Standard Specification for Concrete Aggregates.
  - d.    C90, Standard Specification for Loadbearing Concrete Masonry Units.
  - e.    C140, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
  - f.    C144, Standard Specification for Aggregate for Masonry Mortar.
  - g.    C150, Standard Specification for Portland Cement.
  - h.    C207, Standard Specification for Hydrated Lime for Masonry Purposes.
  - i.    C270, Standard Specification for Mortar for Unit Masonry.
  - j.    C404, Standard Specification for Aggregates for Masonry Grout.
  - k.    C476, Standard Specification for Grout for Masonry.
  - l.    C618 12 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
  - m.    C744, Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.
  - n.    C979, Pigments for Integrally Colored Concrete.
  - o.    C989, Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
  - p.    C1403, Standard Test Method for Rate of Water Absorption of Masonry Mortars.
2.    The Masonry Society (TMS):
  - a.    TMS 402/ACI 530/ASCE 5; Building Code Requirements for Masonry Structures and Companion Commentaries. (MSJC Code and Commentary).
  - b.    TMS 602/ACI530.1/ASCE6; Specification for Masonry Structures.
  - c.    602/American Concrete Institute ACI 530.1/ASCE 6, Specification for Masonry Structures and Companion Commentaries. (Masonry Standards Joint Committee Specifications and Commentary).

3. International Code Council (ICC):
  - a. International Building Code (IBC).
  - b. ICC Evaluation Service (ICC-ES) Reports.

## 1.02 SUBMITTALS

### A. Action Submittals:

1. Shop Drawings.
2. Data Sheets:
  - a. Horizontal joint reinforcement.
  - b. Preformed control joint materials.
  - c. Water repellant masonry sealer.
  - d. Grout mix design.
  - e. Mortar mix design.
  - f. Grout sand gradation in accordance with ASTM C404.
3. Samples:
  - a. Sample: One of each type of masonry unit to be used on Project from the proposed manufacturer.
  - b. Mortar colors for color selection.

### B. Informational Submittals:

1. Method and Location of Placing Grout: High lift or low lift.
2. Mix design test results.
3. Certifications:
  - a. Units comply with ASTM C55 and ASTM C90.
  - b. Grout test results conform to ASTM C1019.
  - c. Grout aggregates conform to requirements of ASTM C33, including nonreactivity.
  - d. Mortar sand conform to requirements of ASTM C144.
4. Test results of Project samples from masonry unit manufacturer stating that units comply with ASTM C90. Documentation of material testing shall be one less than 1 year old.
5. Test results of proposed grout mix design stating that units comply with ASTM C1019. Documentation of material testing shall be 1 year old or less.
6. Test reports stating aggregates for mortar meet requirements of ASTM C144.
7. Test reports or letter of certification stating aggregates for grout meet requirements of ASTM C404.
8. Method and materials for removal of efflorescence.
9. Field test results to qualify materials.
  - a. Grout tests in accordance with ASTM C1019.



## 1.03 QUALITY ASSURANCE

### A. Mockups:

1. Lay up Sample panel for each type of masonry at Site.
2. Dimensions: Minimum 4 feet high by 4 feet long.
3. Use approved materials and procedures.
4. May be part of permanent construction.
5. Approved panels shall serve as basis of color, texture, bond, quality of finished joints, surface applied finishes, and for acceptance of permanent construction.
6. Demonstrate ability to keep grout isolated and in certain cells during any sequence of placement, and to demonstrate materials will be restricted to cells and bond beams intended to receive grout.
7. Construction shall show areas required to receive mortar, including webs on each side of each grouted cell to prevent grout from entering adjacent cells or courses.
8. Where bond beams are to be used, demonstrate proper placement of grout to bond beam level, and proper placement of bond beam prior to placement of grout above bond beam level.
9. Demonstrate proper use of running bond.
10. Compliance Requirements: For masonry finish and appearance, dimension tolerances, tolerances of construction, joint tolerances, and wall plumb tolerances, comply with the requirements and criteria of NCMA, ASTM C90, and TMS 602.1.

### B. Preinstallation Conference:

1. Required Meeting Attendees:
  - a. Masonry subcontractor, including masonry foreman.
  - b. Ready-mix producer.
  - c. Admixture representative.
  - d. Testing and sampling personnel.
  - e. Design Structural Engineer.
2. Schedule and conduct prior to start of masonry construction.
3. Notify Engineer of location and time.
4. Agenda shall include:
  - a. High lift and low lift procedures.
  - b. Mortar, grout, unit, and reinforcing submittals.
  - c. Types and locations of rebar splices.
  - d. Joint tooling.
  - e. Admixture types, dosage, performance, and redosing at Site.
  - f. Mix designs and test of mix.

- g. Placement methods, techniques, equipment, consolidation, and reconsolidation.
  - h. Protection procedures for environmental conditions.
  - i. Other specified requirements requiring coordination.
5. Submit conference minutes as specified in Section 01 31 19, Project Meetings.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Protection: Keep units and mortar/grout cementitious ingredients, including lime, dry.

**PART 2 PRODUCTS**

2.01 COMPRESSIVE STRENGTH OF MASONRY ASSEMBLAGE

- A. Minimum 28-Day Specified Compressive Strength (f'm) of Masonry: 2,000 psi.

2.02 CONCRETE MASONRY UNITS (CMU)

- A. ASTM C90: Lightweight.
- 1. Net Area Compressive Strength: 2,800 psi minimum, in accordance with TMS 602, Table 2.
  - 2. Nominal Size: 16 inches long by 8 inches high by thickness shown on Drawings.
  - 3. Color of Units: Natural.
  - 4. Surface Texture on Exposed Surfaces: Smooth.
  - 5. Surface Texture: Smooth on interior, concealed exterior, and surface 1 foot below finished grade.
- B. General Concrete Masonry Unit (CMU) Requirements:
- 1. Furnish or cut special shapes for corners, jambs, lintels, and other areas shown or required.
  - 2. Special units shall match color and texture of standard units.
  - 3. Where units are placed so end of unit is exposed, such as at a corner or intersection, exposed end of that block shall have surface to match color and texture of sides of other units.
  - 4. Furnish sound, dry, clean units free of cracks, prior to placing in structure.

5. Vertical Cells to be Grouted: Capable of alignment sufficient to maintain clear, unobstructed continuous vertical cell dimensions in accordance with TMS 602, Table 7.
6. Masonry unit size and shape shall allow for all placement patterns. Use vertical grout dams to prevent materials, such as grout, from escaping from cell being filled to adjacent cells where material is not intended to be placed.

## 2.03 MORTAR MATERIALS

### A. Portland Cement-Lime Mortar:

1. ASTM C270.
2. Cement: ASTM C150, Type I and Type II portland cement.
3. Lime: ASTM C207, Type S hydrated.
4. Aggregates:
  - a. Non-reactive in accordance with ASTM C33, Appendix X1.
  - b. Mortar: ASTM C144, sand.

### B. Mortar Cement Mortar: ASTM C1329.

### C. Masonry Cement Mortar: ASTM C91.

### D. Water: Fresh, clean, and potable.

## 2.04 GROUT MATERIALS

### A. Cement: ASTM C150, Type I and Type II portland cement.

### B. Fly Ash: Fly Ash (Pozzolan): Class F and Class C fly ash in accordance with ASTM C618.

### C. Slag Cement: In accordance with ASTM C989, Grade 100 or Grade 120.

### D. Lime: ASTM C207, Type S hydrated.

### E. Aggregates:

1. ASTM C404, fine and coarse.
2. Non-reactive in accordance with ASTM C33, Appendix X1.

### F. Water: Fresh, clean, and potable.

2.05 REINFORCEMENT

- A. Reinforcement: Clean and free from loose rust, scale, and coatings that reduce bond.
- B. Deformed Bars: As specified in Section 03 30 00, Cast-In-Place Concrete.
- C. Horizontal Joint Reinforcement:
  - 1. Two parallel, ASTM A82/A82M, No. 9 wires, galvanized in accordance with ASTM A153/A153M, weld connected to No. 9 perpendicular or diagonal cross wire at 16 inches, maximum, center.
  - 2. Furnish special manufactured corner and wall intersection pieces.
  - 3. Manufacturer: Dayton Superior/Dur-O-Wal, Dayton, OH.

2.06 PREFORMED CONTROL JOINTS

- A. Solid rubber cross-shape extrusions as manufactured by:
  - 1. Dayton Superior/Dur-O-Wal Dayton, OH; DA 2001 Control Joint Regular Rubber.
  - 2. Hohmann and Barnard, Inc, Hauppauge, NY; #RS-Standard.

2.07 MORTAR MIXES

- A. In accordance with ASTM C270, Type S and MSJC Specifications.
- B. Mix Method:
  - 1. Property Method: Minimum average mortar 28-day compressive strength 1,800 psi.
- C. Mixing: Machine mix in approved mixers in accordance with ASTM C270.

2.08 GROUT MIXES

- A. Compressive Strength Property: Minimum 2,000 psi at 28 days. Grout strength shall not exceed two times the minimum specified strength at 28 days.
- B. Mix Design:
  - 1. Proportions:
    - a. Design mix to meet property/strength requirements.
    - b. Where fly ash or slag is included in mix, fly ash or slag content shall be a minimum of 25 percent and a maximum of 40 percent of weight of total cementitious materials.
  - 2. Slump: 8-inch minimum, 11-inch maximum.

C. Mixing:

1. Do not use water reducers, air entrainment, plasticizing, high-range water reducers, or other non-specified admixtures in grout mixes.
2. Transit-Mixed Grout: Meet requirements of ASTM C476.
3. For high lift grouting, add approved grout expansion admixture in accordance with manufacturer's recommendations.
4. Fluid consistency suitable for placing without segregation with a slump of 8 inches to 11 inches.

**PART 3 EXECUTION**

3.01 GENERAL

- A. Meet requirements of 2018 IBC, Chapter 21 and 2016 The Masonry Society (TMS) 602/American Concrete Institute (ACI)530.1/ASCE 6, Specification for Masonry Structures and Companion Commentaries (MSJC), Part 3, Execution, except as modified in this section.
- B. Moisture Protection:
  1. Keep units dry while stored on Site.
  2. Do not wet units prior to laying.
- C. Provide measures to prevent moisture from entering incomplete walls and open cells.
- D. Cold Weather: Meet requirements of MSJC Specification Section "Cold Weather Construction".
- E. Hot Weather: Meet requirements of MSJC Specification Section "Hot Weather Construction".
- F. After construction during cold weather, maintain newly constructed masonry temperature above 32 degrees F for a minimum of 24 hours using MSJC or other approved cold weather methods.
- G. After construction and during hot weather, fog spray newly constructed masonry in accordance with MSJC hot weather construction requirements.

### 3.02 PREPARATION

- A. Concrete Foundations: Meet tolerance requirements of ACI 117 prior to starting any masonry work.
- B. Prepare surface contact area of foundation concrete for initial mortar placement by removing laitance, loose aggregate, and other materials, and anything that would prevent mortar from bonding to foundation.
- C. Patch or grind out-of-tolerance foundation surfaces to receive mortar prior to starting masonry work.
- D. Clean reinforcement dowels and projecting embeds by removing laitance, spillage, or items that will adversely affect grout bond.
- E. Prevent surface damage to foundation concrete that will be exposed to view outside of contact area.

### 3.03 LAYING MASONRY UNITS

- A. General:
  - 1. Finish Tolerances (Measured on Interior Surfaces): Meet requirements of “Site Tolerance” requirements of Part 3, Execution, of the MSJC Specifications.
  - 2. Place units with chipped edges or corners such that chipped area is not exposed to view.
- B. Wall Units:
  - 1. General:
    - a. If necessary to move a unit after once set in-place, remove from wall, clean, and set in fresh mortar.
    - b. Toothing of masonry units is not permitted.
  - 2. Running Bond:
    - a. Unless otherwise shown, lay up walls in straight, level, and uniform courses using a running bond pattern.
    - b. Place units for continuous vertical cells and mortar joints to prevent materials, such as grout, from escaping from cell being filled to adjacent cells where material is not intended to be placed.
    - c. Corners: Lay standard masonry bond for overlapping units and grout solid.
    - d. Intersecting Walls: Half unit appearance shall not extend and be visible on exterior side of intersecting wall. Provide hooked corner bars in bond beam units as shown on Drawings.

3. Special Shapes:
  - a. Provide and place such special units as corner block, doorjamb block, lintel block fillers, and similar blocks as may be required.
  - b. Use required shapes and sizes to work to corners and openings, maintaining proper bond throughout wall.

#### 3.04 BUILT-IN ITEMS

- A. Position door frames, windows, vents, louvers, and other items to be built in wall, and construct wall around them.
- B. Install masonry anchors to secure items to wall.
- C. Fill spaces around items with grout except use mortar at mortar joints.
- D. Do not place electrical, instrumentation, or water conduits in a cell containing parallel reinforcement, unless approved in writing by Engineer. Additionally, pipes, sleeves, and conduits shall meet requirements of TMS 402/ACI 530/ASCE 5, Building Code Requirements for Masonry Structures (MSJC Code) and MSJC specification construction requirements.

#### 3.05 MORTAR JOINTS

- A. General:
  1. Meet masonry erection requirements of MSJC, Part 3, Execution, 3.3B.
  2. As units are laid, remove excess mortar from grout space of cells to be filled. Final grout space, including any remaining mortar projections, shall be as required by MSJC Table "Grout Space Requirements".
  3. Place mortar before initial setting of cement takes place. Retemper only as required for it to remain plastic. Retempering of colored mortar is not allowed.
- B. Exposed Joints:
  1. Tool joints exposed to view after final construction, unless otherwise noted or shown.
  2. Cut joints flush and as mortar takes its initial set; tool to provide a concave joint.
  3. Perform tooling with tool that compacts mortar, pressing excess mortar out.
  4. Perform tooling when mortar is partially set, but still sufficiently plastic to bond rather than dragging it out.
  5. Rake out joints that are not tight at time of tooling, point, and then tool.
  6. Rake and tool joints at split-face surfaces, interior and exterior.
- C. Concealed Joints: Strike flush with no further treatment required.

### 3.06 CONTROL JOINTS

#### A. Preformed Control Joints:

1. Omit mortar from vertical joints.
2. Place in units fabricated to receive rubber control joint material as wall is built.
3. After wall is grouted, cured, and cleaned, install backing rod and sealant as specified in Section 07 92 00, Joint Sealants.
4. Place and tool sealant to match depth of typical joint.

### 3.07 REINFORCING

#### A. Foundation Dowels:

1. Locate first foundation dowel at end of wall in center of first cell; typically 4 inches from end of wall.
2. Locate at each side of control joints and openings and below beam and joist seats, and then locate at maximum required spacing between these bars.
3. Size, number, and location of foundation dowels shall match all typical and additional vertical wall reinforcing, unless otherwise noted.
4. When foundation dowel does not line up with vertical core, do not slope more than 1 horizontal to 6 vertical to bring it into alignment.

#### B. Vertical Reinforcing:

1. Use deformed bars.
2. Hold in position near ends of bars by wire ties to dowels or by reinforcing positioners.
3. For high lift grouting, hold in position at maximum intervals of 160 bar diameters by reinforcing positioners.
4. Lap reinforcing bars as shown or approved.
5. Wire tie splices together.
6. Minimum Bar Clearance: 1/2-inch from masonry for coarse grout 1/4-inch from masonry for fine grout, from formed surfaces, and from parallel bars in same grout space.

#### C. Horizontal Reinforcing:

1. Use deformed bars.
2. Lay on webs of bond beam units and place as wall is built. Increase web depth to ensure 1/2-inch cover over top of rebar.
3. Lap reinforcing bars where spliced and wire tie together.



4. Minimum Bar Clearance: 1/2 inch from masonry for coarse grout  
1/4 inch from masonry for fine grout, from formed surfaces, and from parallel bars in same grout space.
5. Terminate reinforcing bars 2 inches clear from control joints except horizontal bars at roof and floor courses shall be continuous through joints.

D. Horizontal Joint Reinforcement:

1. Use where indicated on Drawings.
2. Provide in addition to typical, deformed horizontal reinforcing steel.
3. Space maximum 16 inches apart, vertically.
4. Lap ends 16 inches minimum.
5. Terminate reinforcing 2 inches clear from control joints except reinforcement at roof and floor courses shall be continuous through joints.
6. Use manufactured corner and other wall intersection pieces.

3.08 MORTAR PRODUCTION

- A. Mix bulk materials in accordance with MSJC Specification.
- B. Mix prebagged materials with water to produce a workable consistency.
- C. Remix or retemper to maintain workability. Discard mortar that has begun to stiffen or is not used within 2-1/2 hours after initial mixing.

3.09 GROUT PLACEMENT

- A. Do not mix, convey, or place with equipment constructed of aluminum.
- B. Secure vertical and horizontal reinforcement, ties, bolts, anchors, and other required embedments in place; inspect and verify before placing grout.
- C. Grout beams over openings in one continuous operation.
- D. Maintain vertical alignment in accordance with ACI 530.1, Table 7:
  1. Place grout within 1-1/2 hours of addition of water to mix.
  2. Use reinforcing positioners to secure vertical reinforcement.
- E. Grouting Requirements:
  1. Partial grout all walls as shown.
    - a. Slump: 8 inches to 11 inches.
    - b. Do not start grouting until wall mortar has cured for 24 hours, minimum.

2. Fully embed horizontal steel with grout in an uninterrupted pour.
3. Do not construct wall more than one course above top of grout pour prior to placing grout.
4. Partial Grouting Requirements:
  - a. Fill cells containing reinforcing steel, anchor bolts, and other embedded items as shown with grout.
  - b. Construct cells to be filled to confine grout within cell.
  - c. Cover tops of unfilled vertical cells under a bond beam with metal lath to confine grout fill to bond beam section.
  - d. Form horizontal construction joints between pours by stopping grout pour 1-1/2 inches below a mortar joint, except at a bond beam; stop pour 1/2 inch below top of masonry unit.

F. Vibration:

1. Use internal “pencil” type, low energy vibrator to thoroughly consolidate grout and reduce amount of air voids. Do not use concrete vibrators.
2. After initial water loss and settlement has occurred, but before it has taken any set, reconsolidate grout.
3. Waiting period for reconsolidation will vary depending upon weather conditions and block absorption rates, but under “normal” weather conditions with average masonry units the waiting period should be between 30 minutes and 60 minutes.

G. Cleanouts:

1. Construct in accordance with MSJC specification.
2. Provide for grout pours heights over 5 feet 4 inches in accordance with the 2018 IBC.
3. Provide of sufficient size to permit cleaning of cell, positioning of reinforcing, and inspection at bottom of every vertical cell containing reinforcing and maximum of 32 inches on center.
4. Location: Concealed from view after final construction, unless otherwise approved by Engineer.
5. After wall has been inspected and approved and prior to grouting, cap cleanouts in a manner that will seal them from grout leakage and provide a flush finish.

### 3.10 FIELD QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.
- C. Masonry shall be tested by testing agency retained by Owner.
- D. Provide adequate facilities for safe storage and proper curing of masonry prisms, mortar samples, and grout samples, as applicable, onsite for first 24 hours, and for additional time as may be required before transporting to test lab.
- E. Masonry Testing:
  - 1. Masonry strength shall be determined using unit strength method as shown.
  - 2. Unit Strength Method:
    - a. Method and frequency for mortar, grout, and masonry unit sampling and testing shall be as shown.
    - b. Provide masonry units for test samples required.
- F. Corrective Action:
  - 1. If compressive strength tests made prior to construction of permanent structure fail to meet Specifications, adjustments shall be made to mix designs for mortar, or grout, or both, as needed to produce specified strength.
  - 2. If strength tests performed on materials representative of in-place construction fail to meet Specifications, prisms or cores shall be cut from constructed walls in sufficient locations to adequately determine strength in accordance with IBC 2105.3.

### 3.11 CLEANING

- A. Immediately after completion of grouting, clean masonry surfaces of excess mortar, grout spillage, scum, stains, dirt, and other foreign substances using clean water and fiber brushes.
- B. Clean walls not requiring painting or sealing so there are no visible stains.

3.12 PROTECTION OF INSTALLED WORK

- A. Do not allow grout and mortar stains to dry on face of exposed masonry.
- B. Protect tops of walls at all times. Cover tops of walls with waterproof paper when rain or snow is imminent and when the Work is discontinued.
- C. Adequately brace walls until walls and roof are completed.
- D. Provide sufficient bracing to protect walls against damage from elements, including wind and snow.
- E. Protect masonry against freezing for minimum 72 hours after being laid.
- F. Protect masonry from damage until final acceptance of the Work. Damaged units will not be accepted.

**END OF SECTION**

**SECTION 05 05 19  
POST-INSTALLED ANCHORS**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    American Concrete Institute (ACI):
    - a.    318, Building Code Requirements for Structural Concrete.
    - b.    355.2, Qualification of Post-Installed Mechanical Anchors in Concrete.
    - c.    355.4, Qualification of Post-Installed Adhesive Anchors in Concrete.
  2.    American Iron and Steel Institute (AISI): Stainless Steel Type 316.
  3.    American National Standards Institute (ANSI).
  4.    ASTM International (ASTM):
    - a.    A123/A123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - b.    A143, Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
    - c.    A153/A153M, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - d.    A193/A193M, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
    - e.    A194/A194M, Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both.
    - f.    A380, Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
    - g.    A385, Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
    - h.    A563, Specification for Carbon and Alloy Steel Nuts.
    - i.    A780, Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
    - j.    A967, Specification for Chemical Passivation Treatments for Stainless Steel Parts.
    - k.    E488, Standard Test Methods for Strength of Anchors in Concrete Elements.
    - l.    F436, Specification for Hardened Steel Washers.
    - m.    F468, Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.

- n. F568M, Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners.
- o. F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- p. F594, Specification for Stainless Steel Nuts.
- q. F1554, Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- 5. International Association of Plumbing and Mechanical Officials Uniform ES (IAPMO-UES): Evaluation Reports for Concrete and Masonry Anchors.
- 6. International Code Council Evaluation Service (ICC-ES):
  - a. Evaluation Reports for Concrete and Masonry Anchors.
  - b. AC01, Acceptance Criteria for Expansion Anchors in Masonry Elements.
  - c. AC70, Acceptance Criteria for Fasteners Power-driven into Concrete, Steel and Masonry Elements.
  - d. AC106, Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements.
  - e. AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.
  - f. AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements. Evaluation Reports for Concrete and Masonry Anchors.
- 7. Specialty Steel Industry of North America (SSINA):
  - a. Specifications for Stainless Steel.
  - b. Design Guidelines for the Selection and Use of Stainless Steel.
  - c. Stainless Steel Fabrication.
  - d. Stainless Steel Fasteners.

## 1.02 DEFINITIONS

- A. Corrosive Area: Containment area or area exposed to delivery, storage, transfer, or use of chemicals.
- B. Exterior Area: Location not protected from weather by a building or other enclosed structure to include buried roof structures.
- C. Interior Dry Area: Location inside building or structure where floor is not subject to liquid spills or wash down, and where wall or roof slab is not common to a water-holding or earth-retaining structure.

- D. Interior Wet Area: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or wash down, or where wall, floor, or roof slab is common to a water-holding or earth-retaining structure.
- E. Submerged: Location at or below top of wall of open water-holding structure, such as a basin or channel, or wall, ceiling, or floor surface inside a covered water-holding structure, or exterior below-grade wall or roof surface of water-holding structure, open or covered.

### 1.03 SUBMITTALS

#### A. Action Submittals:

- 1. Shop Drawings: Specific instructions for concrete anchor installation, including drilled hole size and depth, preparation, placement, procedures, and instructions for safe handling of anchoring systems.

#### B. Informational Submittals:

- 1. Concrete and Masonry Anchors:
  - a. Manufacturer's product description and installation instructions.
  - b. Current ICC-ES or IAPMO-UES Report for each type of post-installed anchor to be used.
  - c. Adhesive Anchor Installer Certification.
- 2. Passivation method for stainless steel members.
- 3. Hot-Dip Galvanizing: Certificate of Compliance signed by galvanizer, with description of material processed and ASTM standard used for coating.

### 1.04 QUALITY ASSURANCE

#### A. Qualifications:

- 1. Installers of adhesive anchors horizontally or upwardly inclined to support sustained tension loads shall be certified by an applicable certification program. Certification shall include written and performance tests in accordance with the ACI/CRSI Adhesive Installer Certification Program or equivalent.
- 2. Galvanized Coating Applicator: Company specializing in hot-dip galvanizing after fabrication and following procedures of Quality Assurance Manual of the American Galvanizers Association.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package stainless steel items in a manner to provide protection from carbon impregnation.
- B. Protect hot-dip galvanized finishes from damage as a result of metal banding and rough handling.

**PART 2 PRODUCTS**

2.01 GENERAL

- A. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Stainless Steel:	
Threaded Rods	F593, AISI Type 316, Condition CW
Nuts*	F594, AISI Type 316, Condition CW
Carbon Steel:	
Threaded Rods	F1554, Grade 36 or F568M Class 5.8
Flat and Beveled Washers (Hardened)	F436
Nuts*	A194/A194M, Grade 2H
Galvanized Steel:	
All	A153/A153M
*Nuts of other grades and styles having specified proof load stresses greater than specified grade and style are also suitable. Nuts must have specified proof load stresses equal to or greater than minimum tensile strength of specified threaded rod.	

- B. Bolts, Washers, and Nuts: Use stainless steel, hot-dip galvanized steel, and zinc-plated steel material types as indicated in Fastener Schedule at end of this section.



## 2.02 POST-INSTALLED CONCRETE ANCHORS

### A. General:

1. AISI Type 316 stainless, hot-dip galvanized or zinc-plated steel, as shown in Fastener Schedule at end of this section.
2. Post-installed anchor systems used in concrete shall be approved by ICC Evaluation Services Report or equivalent for use in cracked concrete and for short-term and long-term loads including wind and earthquake.
3. Mechanical Anchors: Comply with the requirements of ICC-ES AC193 or ACI 355.2.
4. Adhesive Anchors: Comply with the requirements of ICC-ES AC308 or ACI 355.4.

### B. Torque-Controlled Expansion Anchors (Wedge Anchors):

1. Manufacturers and Products:
  - a. Hilti, Inc., Tulsa, OK; Kwik-Bolt –TZ (KB-TZ) Anchors (ESR-1917).
  - b. DeWalt/Powers Fasteners, Brewster, NY; Power-Stud +SD1, +SD2, +SD4, or +SD6 Anchors (ESR-2502 and ESR-2818).
  - c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Strong-Bolt 2 Anchors (ESR-1771 and ESR-3037).

### C. Undercut Anchors:

1. Manufacturers and Products:
  - a. USP Structural Connectors, Burnsville, MN; DUC Undercut Anchor (ESR-1970).
  - b. Hilti, Inc., Tulsa, OK; HDA Undercut Anchor (ESR-1546).
  - c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; TORQ-CUT Self-Undercutting Anchor (ESR-2705).
  - d. DeWalt/Powers Fasteners, Brewster, NY; Atomic+ Undercut Anchor (ESR-3067).

### D. Self-Tapping Concrete Screw Anchors:

1. Manufacturers and Products:
  - a. DeWalt/Powers Fasteners, Brewster, NY; Wedge-Bolt+ (ESR-2526).
  - b. DeWalt/Powers Fasteners, Brewster, NY; Vertigo+ Rod Hanger Screw Anchor (ESR-2989).

- c. DeWalt/Powers Fasteners, Brewster, NY; Snake+ Flush Mount Screw Anchor (ESR-2272).
- d. Hilti, Inc., Tulsa, OK; HUS-EZ Screw Anchor (ESR-3027).
- e. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Titen HD Screw Anchor (ESR-2713).

E. Adhesive Anchors:

- 1. Threaded Rod:
  - a. Diameter as shown on Drawings.
  - b. Length as required to provide minimum depth of embedment indicated and thread projection required.
  - c. Clean and free of grease, oil, or other deleterious material.
- 2. Adhesive:
  - a. Two-component, insensitive to moisture, designed to be used in adverse freeze/thaw environments.
  - b. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions.
- 3. Packaging and Storage:
  - a. Disposable, self-contained system capable of dispensing both components in proper mixing ratio and fitting into a manually or pneumatically operated caulking gun.
  - b. Store adhesive on pallets or shelving in a covered storage area.
  - c. Package Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
  - d. Dispose of When:
    - 1) Shelf life has expired.
    - 2) Stored other than in accordance with manufacturer's instructions.
- 4. Manufacturers and Products:
  - a. Hilti, Inc., Tulsa, OK; HIT Doweling Anchor System, HIT RE 500 V3 (ESR-3814).
  - b. Simpson Strong-Tie Co., Inc., Pleasanton, CA; SET-3G Epoxy Adhesive Anchors. (ESR-4057). Adhesive Threaded Inserts:
- 5. Type 316 stainless steel, internally threaded inserts.
- 6. Manufacturer and Product: Hilti, Inc., Tulsa, OK; HIS-RN Insert with HIT-RE 500-V3 adhesive.

## 2.03 POST-INSTALLED MASONRY ANCHORS

- A. General: AISI Type 316 stainless, hot-dip galvanized, or zinc-plated steel, as shown in Fastener Schedule at end of section.
- B. Current ICC Evaluation Report indicating acceptance for anchors at structural applications in masonry.
- C. Manufacturers and Products:
  - 1. Hilti, Inc., Tulsa, OK; Kwik-Bolt-3 (KB-3) (ESR-1385), for grout-filled masonry, HIT-HY 70 (ESR-2682) for grout filled CMU, hollow CMU, or unreinforced masonry.
  - 2. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Strong-Bolt 2 (IAPMO ER 240) for grout filled CMU, Titen-HD (ESR-1056) for grout filled or hollow CMU, AT-XP (IAPMO ER-281) for grout filled CMU.
  - 3. DeWalt/Powers Fasteners, Brewster NY; Power-Stud+ SD1 (ESR-2966) for grout-filled masonry, Wedgebolt+ (ESR-1678) for grout-filled masonry.

## PART 3 EXECUTION

### 3.01 CONCRETE AND MASONRY ANCHORS

- A. Begin installation only after concrete or masonry to receive anchors has attained design strength.
- B. Locate existing reinforcing with Ground Penetrating Radar or other method approved by Engineer prior to drilling. Coordinate with Engineer to adjust anchor locations where installation would result in hitting reinforcing.
- C. Install in accordance with written manufacturer's instructions.
- D. Provide minimum embedment, edge distance, and spacing as indicated on Drawings.
- E. Use only drill type and bit type and diameter recommended by anchor manufacturer.
- F. Clean hole of debris and dust per manufacturer's requirements.

- G. When unidentified embedded steel, rebar, or other obstruction is encountered in drill path, slant drill to clear obstruction. If drill must be slanted more than indicated in manufacturer's installation instructions to clear obstruction, notify Engineer for direction on how to proceed.
- H. Adhesive Anchors:
  - 1. Unless otherwise approved by Engineer and adhesive manufacturer:
    - a. Do not install adhesive anchors when temperature of concrete or masonry is below 40 degrees F or above 100 degrees F.
    - b. Do not install prior to concrete attaining an age of 21 days.
    - c. Remove any standing water from hole with oil-free compressed air. Inside surface of hole shall be dry.
    - d. Do not disturb anchor during recommended curing time.
    - e. Do not exceed maximum torque as specified in manufacturer's instructions.
  - 2. For hollow-unit masonry, install screen tube in accordance with manufacturer's instructions.
- I. Prestressed Concrete: Do not use drilled-in anchors in prestressed or post-tensioned concrete members without Engineer's prior approval unless specifically shown on Drawings.

### 3.02 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

## 3.03 FASTENER SCHEDULE

A. Unless indicated otherwise on Drawings, provide fasteners as follows:

Service Use and Location	Product	Remarks
1. Post-Installed Anchors for Metal Components to Cast-in-Place Concrete (such as, Ladders, Handrail Posts, Electrical Panels, Platforms, and Equipment)		
Interior Dry Areas	Anchor material type to match material being anchored (for example, stainless steel anchors to anchor stainless steel equipment, zinc-plated anchors to anchor painted equipment, galvanized anchors to anchor galvanized equipment).	Verify product acceptability and manufacturer's requirements if anchor installation will occur in an overhead application
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel adhesive anchors	Verify product acceptability and manufacturer's requirements if anchor installation will occur in an overhead application
2. Anchors in Grout-Filled Concrete Masonry Units		
Interior Dry Areas	Anchor material type to match material being anchored (for example, stainless steel anchors to anchor stainless steel equipment, zinc-plated anchors to anchor painted equipment, galvanized anchors to anchor galvanized equipment).	
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel anchors	

Service Use and Location	Product	Remarks
3. Anchors in Hollow Concrete Masonry Units		
Interior Dry Areas	Anchor material type to match material being anchored (for example, stainless steel anchors to anchor stainless steel equipment, zinc-plated anchors to anchor painted equipment, galvanized anchors to anchor galvanized equipment).	Adhesive anchors shall be installed with screen tubes.
Exterior, Interior Wet, and Corrosive Areas	Stainless steel adhesive anchors	Adhesive anchors shall be installed with screen tubes.
4. All Others		
All service uses and locations	Stainless steel fasteners	

- B. Antiseizing Lubricant: Use on all stainless steel threads.
- C. Do not use adhesive anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

**END OF SECTION**

**SECTION 05 05 23**  
**WELDING**

**PART 1 GENERAL**

**1.01 REFERENCES**

A. The following is a list of standards that may be referenced in this section:

1. American Society of Mechanical Engineers (ASME):
  - a. BPVC SEC V, Nondestructive Examination.
  - b. BPVC SEC IX, Welding and Brazing Qualifications.
2. American Society of Nondestructive Testing (ASNT): SNT-TC-1A, Personnel Qualification and Certification in Nondestructive Testing.
3. ASTM International (ASTM): A370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products.
4. American Welding Society (AWS):
  - a. A2.4, Standard Symbols for Welding, Brazing, and Nondestructive Examination.
  - b. A3.0, Standard Welding Terms and Definitions.
  - c. D1.1/D1.1M, Structural Welding Code - Steel.
  - d. D1.8/D1.8M, Structural Welding Code - Seismic Supplement.
  - e. D1.2/D1.2M, Structural Welding Code - Aluminum.
  - f. D1.3/1.3M, Structural Welding Code - Sheet Steel.
  - g. D1.4/D1.4M, Structural Welding Code - Reinforcing Steel.
  - h. D1.6/D1.6M, Structural Welding Code - Stainless Steel.
  - i. QC1, Standard for AWS Certification of Welding Inspectors.

**1.02 DEFINITIONS**

A. CJP: Complete Joint Penetration.

B. CWI: Certified Welding Inspector.

1. Contractor's Welding Inspector: Contractor's CWI acts for, and on behalf of, the Contractor for all inspection and quality matters within the scope of the Contract Documents. Contractor is required to provide a welding inspector to oversee welding operations and be responsible for visual inspection and necessary correction of all deficiencies in materials and workmanship required to meet referenced welding codes. This type of Quality Control Inspection is not classified as Special Inspection.
2. Verification Inspector: CWI who acts on behalf of the Owner. This type of independent inspection and testing is the prerogative of the Owner, who may perform this function, or waive independent verification inspection if it is not required by the building official and building code.

- C. MT: Magnetic Particle Testing.
- D. NDE: Nondestructive Examination.
- E. NDT: Nondestructive Testing.
- F. PJP: Partial Joint Penetration.
- G. PQR: Procedure Qualification Record.
- H. PT: Liquid Penetrant Testing.
- I. Special Inspection: Non-destructive examination exclusive of VT. Special inspection includes NDE such as MT, PT, UT, RT and Verification Inspection. Special Inspection personnel report to, and are retained by the Owner. See additional requirements in Section 01 45 33, Special Inspection, Observation, and Testing.
- J. RT: Radiographic Testing.
- K. UT: Ultrasonic Testing.
- L. VT: Visual Inspection/Testing.
- M. WPQ: Welder/Welding Operator Performance Qualification Record.
- N. WPS: Welding Procedure Specification.

#### 1.03 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Shop and field WPSs and PQRs.
    - b. NDT procedure specifications prepared in accordance with ASME BPVC SEC V.
    - c. Welding Data (Shop and Field): Submit welding data together with Shop Drawings as a complete package.
      - 1) Show on Shop Drawings, or on a weld map, complete information regarding base metal specification designation, location, type, size, and extent of welds with reference called out for WPS and NDE numbers in tails of combined welding and NDE symbols as indicated in AWS A2.4.
      - 2) Clearly distinguish between shop and field welds.



- 3) Indicate, by welding symbols or sketches, details of welded joints and preparation of base metal. Provide complete joint welding details showing bevels, groove angles, and root openings for welds.
- 4) Welding and NDE Symbols: In accordance with AWS A2.4.
- 5) Welding Terms and Definitions: In accordance with AWS A3.0.

B. Informational Submittals:

1. WPQs.
2. CWI credentials.
3. Testing agency personnel credentials.
4. CWI visual inspection (VT) reports.
5. Welding Documentation: Submit on forms in referenced welding codes.

1.04 QUALIFICATIONS

- A. WPSs: In accordance with AWS D1.1/D1.1M (Annex M Forms) for shop or field welding; or ASME BPVC SEC IX (Forms QW-482 and QW-483) for shop welding only.
- B. WPQs: In accordance with AWS D1.1/D1.1M (Annex M Forms); or ASME BPVC SEC IX (Form QW-484).
- C. CWI: Certified in accordance with AWS QC1, and having prior experience with specified welding codes. Alternate welding inspector qualifications require prior approval by Engineer.
- D. Testing Agency: Personnel performing tests shall be NDT Level II certified in accordance with ASNT SNT-TC-1A.

1.05 SEQUENCING AND SCHEDULING

- A. Unless otherwise specified, Submittals required in this section shall be submitted and approved prior to commencement of welding operations.

## **PART 2 PRODUCTS**

### **2.01 SOURCE QUALITY CONTROL**

- A. Contractor's CWI shall be present whenever shop welding is performed. CWI shall perform inspection at suitable intervals, prior to assembly, during assembly, during welding, and after welding. CWI shall perform inspections as required in AWS D1.1/D1.1M or referenced welding code and as follows:
  - 1. Verifying conformance of specified job material and proper storage.
  - 2. Monitoring conformance with approved WPS.
  - 3. Monitoring conformance of WPQ.
  - 4. Inspecting weld joint fit-up and performing in-process inspection.
  - 5. Providing 100 percent visual inspection of welds.
  - 6. Coordinating with nondestructive testing personnel and reviewing NDE test results.
  - 7. Maintaining records and preparing reports documenting that results of CWI VT and subsequent NDE testing comply with the Work and referenced welding codes.

## **PART 3 EXECUTION**

### **3.01 GENERAL**

- A. Welding and Fabrication by Welding: Conform to governing welding codes referenced in attached Welding and Nondestructive Testing Table.

### **3.02 NONDESTRUCTIVE WELD TESTING REQUIREMENTS**

- A. Quality Control Inspection:
  - 1. All Welds: 100 percent VT by Contractor's CWI.
  - 2. Acceptance Criteria:
    - a. Structural Pipe and Tubing: AWS D1.1/D1.1M, Paragraph 9.25.
    - b. All Other Structural Steel: AWS D1.1/D1.1M, Paragraph 6.9, Visual Inspection, Statically Loaded Nontubular Connections.
    - c. Stud Connections: AWS D1.1/D1.1M, Paragraph 7.8.1.

## B. Nondestructive Testing Requirements:

1. NDT frequency shall be as specified below, as required by referenced welding codes, or as specified in the attached table. In case there is a conflict, the higher frequency level of NDT shall apply.
  - a. Nontubular Connections:
    - 1) CJP Butt Joint Groove Welds: 10 percent random RT. Use UT for CJP butt joint groove welds that cannot be readily radiographed.
    - 2) All Other CJP Groove Welds: 10 percent random UT.
    - 3) Fillet Welds and PJP Groove Welds: 10 percent random PT or MT.
  - b. Tubular Connections:
    - 1) CJP butt joint groove welds made from one side without backing: 100 percent RT or UT in accordance with AWS D1.1/D1.1M, Paragraph 9.26.2 requirements.
    - 2) CJP Butt Joint Groove Welds made without backing or back-gouging: 10 percent random RT. Use UT for CJP butt joint groove welds that cannot be readily radiographed.
    - 3) All Other CJP Groove Welds: 10 percent random UT.
    - 4) Fillet Welds and PJP Groove Welds: 10 percent random PT or MT.
2. NDT Procedures and Acceptance Criteria:
  - a. Nontubular Connections:
    - 1) RT: Perform in accordance with AWS D1.1/D1.1M, Clause 6, Part E. Acceptance criteria per AWS D1.1/D1.1M, Paragraph 6.12.1.
    - 2) UT: Perform in accordance with AWS D1.1/D1.1M, Clause 6, Part F. Acceptance criteria per AWS D1.1/D1.1M, Paragraph 6.13.1.
    - 3) PT and MT:
      - a) Perform on fillet and PJP groove welds in accordance with AWS D1.1/D1.1M, Paragraph 6.14.4 and Paragraph 6.14.5.
      - b) Acceptance criteria per AWS D1.1/D1.1M, Paragraph 6.9, Visual Inspection, Statically Loaded Nontubular Connections.
  - b. Tubular Connections:
    - 1) RT: Comply with requirements for Nontubular Connections and additional requirements of AWS D1.1/D1.1M, Clause 9, Paragraph 9.28 and Paragraph 9.29.
    - 2) UT: Comply with requirements for Nontubular Connections and additional requirements of AWS D1.1/D1.1M, Clause 9, Paragraph 9.27.

- 3) PT and MT:
  - a) Perform on fillet and PJP groove welds in accordance with AWS D1.1/D1.1M, Paragraph 6.14.4 and Paragraph 6.14.5.
  - b) Acceptance criteria per AWS D1.1/D1.1M, Paragraph 9.25.

### 3.03 FIELD QUALITY CONTROL

- A. Contractor's CWI shall be present whenever field welding is performed. CWI shall perform inspection, at suitable intervals, prior to assembly, during assembly, during welding, and after welding. CWI shall perform inspections as required in AWS D1.1/D1.1M or referenced welding code and as follows:
  - 1. Verify conformance of specified job material and proper storage.
  - 2. Monitor conformance with approved WPS.
  - 3. Monitor conformance of WPQ.
  - 4. Inspect weld joint fit-up and perform in-process inspection.
  - 5. Provide 100 percent visual inspection of all welds in accordance with Subparagraph Quality Control Inspection.
  - 6. Supervise nondestructive testing personnel and evaluating test results.
  - 7. Maintain records and prepare report confirming results of inspection and testing comply with the Work.

### 3.04 WELD DEFECT REPAIR

- A. Repair and retest rejectable weld defects until sound weld metal has been deposited in accordance with appropriate welding codes.

### 3.05 SUPPLEMENTS

- A. The supplement listed below, following "End of Section," is a part of this Specification.
  - 1. Welding and Nondestructive Testing Table.

### **END OF SECTION**

Welding and Nondestructive Testing						
Specification Section	Governing Welding Codes or Standards	Submit WPS	Submit WPQ	Onsite CWI Req'd	Submit Written NDT Procedure Specifications	NDT Requirements
03 21 00 Steel Reinforcement	AWS D1.4/D1.4M, Structural Welding Code - Reinforcing Steel	Yes	Yes	Yes	Yes	100% VT and 100% MT of all rebar splices; also see Section 03 21 00
03 40 00 Precast Concrete	AWS D1.1/D1.1M, Structural Welding Code - Steel and AWS D1.4/D1.4M, Structural Welding Code - Reinforcing Steel	Yes	Yes	Yes	Yes	100% VT; also see Section 03 40 00
05 50 00 Metal Fabrications	AWS D1.1/D1.1M, Structural Welding Code-Steel or AWS D1.2/D1.2M, Structural Welding Code - Aluminum or AWS D1.6/D1.6M, Structural Welding Code - Stainless Steel	Yes	Yes	Yes	Yes	100% VT; also see Section 05 50 00
05 52 16 Aluminum Railings 05 52 19 Steel Railings	AWS D1.1/D1.1M, Structural Welding Code - Steel or AWS D1.2/D1.2M, Structural Welding Code - Aluminum	No	No	No	No	100% VT; also see Section 05 52 16, Aluminum Railings 05 52 19, Steel Railings
05 53 00 Metal Gratings	AWS D1.1/D1.1M, Structural Welding Code - Steel or AWS D1.2/D1.2M, Structural Welding Code - Aluminum	No	No	No	No	100% VT; also see Section 05 53 00



**SECTION 05 50 00  
METAL FABRICATIONS**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    The Aluminum Association, Inc. (AA): The Aluminum Design Manual.
  2.    American Galvanizers Association (AGA):
    - a.    Inspection of Hot-Dip Galvanized Steel Products.
    - b.    Quality Assurance Manual.
  3.    American Institute of Steel Construction (AISC):
    - a.    201, Certification Program for Structural Steel Fabricators.
    - b.    206, Certification Program for Structural Steel Erectors—Standard for Structural Steel Erectors.
    - c.    303, Code of Standard Practices for Steel Buildings and Bridges.
    - d.    325, Steel Construction Manual.
    - e.    326, Detailing for Steel Construction.
    - f.    341, Seismic Provisions for Structural Steel Buildings.
    - g.    360, Specification for Structural Steel Buildings.
    - h.    420, Certification Standard for Shop Application of Complex Protective Coating Systems.
  4.    American Iron and Steel Institute (AISI): Stainless Steel Types.
  5.    American Ladder Institute (ALI): A14.3, Ladders - Fixed - Safety Requirements.
  6.    American National Standards Institute (ANSI).
  7.    American Welding Society (AWS):
    - a.    D1.1/D1.1M, Structural Welding Code - Steel.
    - b.    D1.2/D1.2M, Structural Welding Code - Aluminum.
    - c.    D1.6/D1.6M, Structural Welding Code - Stainless Steel.
  8.    ASTM International (ASTM):
    - a.    A36/A36M, Standard Specification for Carbon Structural Steel.
    - b.    A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
    - c.    A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
    - d.    A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - e.    A143/A143M, Standard for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

- f. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- g. A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
- h. A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
- i. A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- j. A276, Standard Specification for Stainless Steel Bars and Shapes.
- k. A283/A283M, Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
- l. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- m. A325, Standard Specification for Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength.
- n. A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
- o. A384/A384M, Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
- p. A385/A385M, Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
- q. A489, Standard Specification for Carbon Steel Lifting Eyes.
- r. A500/A500M, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- s. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- t. A563, Standard Specification for Carbon and Alloy Steel Nuts.
- u. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- v. A780/A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- w. A786/A786M, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
- x. A793, Standard Specification for Rolled Floor Plate, Stainless Steel.
- y. A967, Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts.
- z. A992/A992M, Standard Specification for Structural Steel Shapes.



- aa. A1085, Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS).
  - bb. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - cc. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - dd. B429/B429M, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
  - ee. B632/B632M, Standard Specification for Aluminum-Alloy Rolled Tread Plate.
  - ff. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
  - gg. D1056, Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
  - hh. F436, Standard Specification for Hardened Steel Washers.
  - ii. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
  - jj. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
  - kk. F594, Standard Specification for Stainless Steel Nuts.
  - ll. F844, Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
  - mm. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
9. NSF International (NSF): 61, Drinking Water System Components—Health Effects.
10. Occupational Safety and Health Administration (OSHA):
- a. 29 CFR 1910.23, Ladders.
  - b. 29 CFR 1910.28, Duty to Have Fall Protection and Falling Object Protection.
  - c. 29 CFR 1910.29, Fall Protection Systems and Falling Object Protection-Criteria and Practices.
  - d. 29 CFR 1926.105, Safety Nets.
  - e. 29 CFR 1926.502, Fall Protections Systems Criteria and Practices.
11. Specialty Steel Industry of North America (SSINA):
- a. Specifications for Stainless Steel.
  - b. Design Guidelines for the Selection and Use of Stainless Steel.
  - c. Stainless Steel Fabrication.
  - d. Stainless Steel Fasteners.

## 1.02 DEFINITIONS

- A. Anchor Bolt: Cast-in-place anchor; concrete or masonry.
- B. Corrosive Area: Containment area or area exposed to delivery, storage, transfer, or use of chemicals. Corrosive area includes areas exposed to corrosive atmosphere such as hydrogen sulfide from wastewater.
- C. Exterior Area: Location not protected from weather by building or other enclosed structure.
- D. Interior Dry Area: Location inside building or structure where floor is not subject to liquid spills or washdown, nor where wall or roof slab is common to a water-holding or earth-retaining structure.
- E. Interior Wet Area: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or washdown, or where wall, floor, or roof slab is common to a water-holding or earth-retaining structure.
- F. Submerged: Location at or below top of wall of open water-holding structure, such as basin or channel, or wall, ceiling or floor surface inside a covered water-holding structure, or exterior belowgrade wall or roof surface of water-holding structure, open or covered.

## 1.03 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings: Metal fabrications, including welding and fastener information.
  - 2. Samples: Color samples of abrasive stair nosings.
- B. Informational Submittals:
  - 1. U-Channel Concrete Inserts:
    - a. Manufacturer's product description.
    - b. Allowable load tables.
  - 2. Pre-engineered Ladders: Letter of certification that ladder meets OSHA 29 CFR 1910.23 requirements, ALI 14.3 requirements and specifications herein.
  - 3. Passivation method for stainless steel members.
  - 4. Galvanized coating applicator qualifications.
  - 5. Hot-Dip Galvanizing: Certificate of compliance signed by galvanizer, with description of material processed and ASTM standard used for coating.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Galvanized Coating Applicator: Company specializing in hot-dip galvanizing after fabrication and following procedures of Quality Assurance Manual of the American Galvanizers Association.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Insofar as practical, factory assemble specified items. Package assemblies, which have to be shipped unassembled to protect materials from damage and tag to facilitate identification and field assembly.
- B. Package stainless steel items to provide protection from carbon impregnation.
- C. Protect painted coatings and hot-dip galvanized finishes from damage as a result of metal banding and rough handling. Use padded slings and straps.
- D. Store fabricated items in dry area, not in direct contact with ground.

1.06 SPECIAL GUARANTEE

- A. Manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at option of Owner, removal and replacement of sidewalk doors and floor hatches found defective during a period of 5 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in General Conditions.

**PART 2 PRODUCTS**

2.01 GENERAL

- A. For hot-dip galvanized steel that is exposed to view and does not receive paint, limit the combined phosphorus and silicon content to 0.04 percent. For steels that require a minimum of 0.15 percent silicon (such as plates over 1.5 inches thick for ASTM A36/A36M steel), limit maximum silicon content to 0.21 percent and phosphorous content to 0.03 percent.

## B. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Steel Wide Flange Shapes	A992/992M
Other Steel Shapes and Plates	A36/A36M or A572/A572M, Grade 50 or A992/A992M for other steel shapes
Steel Pipe	A500, Grade B
Hollow Structural Sections (HSS)	A500/A500M, Grade C
Aluminum:	
Aluminum Plates	B209, Alloy 6061-T6
Aluminum Structural Shapes	ASTM B221/B221M, Alloy 6061-T6
Stainless Steel:	
Bars and Angles	A276, AISI Type 316 (316L for welded connections)
Shapes	A276, AISI Type 304 (304L for welded connections)
Steel Plate, Sheet, and Strip	A240/A240M, AISI Type 316 (316L for welded connections)
Bolts, Threaded Rods, Anchor Bolts, and Anchor Studs	F593, AISI Type 316, Group 2, Condition SH
Nuts	F594, AISI Type 316, Condition CW
Steel Bolts and Nuts:	
Carbon Steel	A307 bolts, with A563 nuts
High-Strength	F3125, Type 1 bolts, with A563 nuts
Anchor Bolts and Rods	F1554, Grade 36, with weldability supplement S1
Eyebolts	A489
Threaded Rods	A36/A36M
Flat Washers (Unhardened)	F844
Flat and Beveled Washers (Hardened)	F436

Item	ASTM Reference
Thrust Ties for Steel Pipe:	
Threaded Rods	A193/A193M, Grade B7
Nuts	A194/A194M, Grade 2H
Plate	A283/A283M, Grade D
Welded Anchor Studs	A108, Grades C-1010 through C-1020
Aluminum Bolts and Nuts	F468, Alloy 2024-T4
Cast Iron	A48/A48M, Class 35

- C. Bolts, Washers, and Nuts: Use stainless steel, hot-dip galvanized steel, zinc-plated steel, and aluminum material types as indicated in Fastener Schedule at end of this section.

## 2.02 ANCHOR BOLTS AND ANCHOR BOLT SLEEVES

### A. Cast-In-Place Anchor Bolts:

1. Headed type, unless otherwise shown on Drawings.
2. Material type and protective coating as shown in Fastener Schedule at end of this section.

### B. Anchor Bolt Sleeves:

1. Plastic:
  - a. Single unit construction with corrugated sleeve.
  - b. Top of sleeve shall be self-threading to provide adjustment of threaded anchor bolt projection.
  - c. Material: High-density polyethylene.
2. Fabricated Steel: ASTM A36/A36M.

## 2.03 POST-INSTALLED CONCRETE AND MASONRY ANCHORS

- A. See Section 05 05 19, Post-Installed Anchors.

2.04 STUD SHEAR CONNECTORS

- A. Headed anchor studs (HAS), or threaded anchor studs (TAS), or stud shear connectors, as indicated on Drawings.
  - 1. Stainless Steel: ASTM F593, AISI Type 316, Condition CW, where indicated.
- B. Manufacturers:
  - 1. Nelson Stud Welding, FabriSteel Co., Elyria, OH.
  - 2. Stud Welding Associates, Inc., Elyria, OH.

2.05 PIPE SLEEVES

- A. In accordance with Section 40 27 01, Process Piping Specialties.

2.06 LINTELS AND SHELF ANGLES

- A. A276, AISI Type 316 (316L for welded connections).

2.07 EMBEDDED STEEL SUPPORT FRAMES FOR FLOOR PLATE AND GRATING

- A. Steel angle support frames to be embedded in concrete shall be stainless steel, ASTM A276, AISI Type 316L, unless indicated otherwise.
- B. Welded anchors for stainless steel support frames shall also be stainless steel.

2.08 U-CHANNEL CONCRETE INSERTS

- A. Rolled ASTM A240/A240M, AISI Type 316 stainless steel, 0.105-inch-thick, 1-5/8 inches wide by 1-3/8 inches deep, with stainless steel anchors at 10-inch maximum spacing, styrofoam fillers, and end caps.
- B. Nut and Bolt Hardware: Type 316 stainless steel, 5/8-inch minimum diameter, unless indicated otherwise. Manufacturer's standard to match insert.
- C. Manufacturers and Products:
  - 1. Power-Strut, Wayne, MI; PS 349 Series.
  - 2. B-Line Systems, Inc., Highland, IL; B32 Series.
  - 3. Halfen Anchoring Systems, Converse, TX; Channel Type HZA Dynagrip.

## 2.09 ABRASIVE NOSING FOR STAIRS

- A. Unless otherwise shown on Drawings, furnish flush type abrasive nosings on stairs.
- B. Nosing Components:
  - 1. Homogeneous epoxy abrasive, with minimum 50 percent aluminum oxide content, formed and cured upon an extruded aluminum base.
  - 2. Epoxy abrasive shall extend over and form curved front edge of nosing.
  - 3. Base of Nosing: Extruded aluminum alloy, 6063-T5, heat-treated.
- C. Anchoring System: Double-set anchors consisting of two rows of integrally extruded anchors.
- D. Size: 3 inches wide by 1/4 inch to 3/8 inch thick by length as shown.
- E. Color: Selected by Engineer from manufacturer's standard color range.
- F. Manufacturers and Products:
  - 1. Wooster Products, Inc., Wooster, OH; Spectra Type WP3J and Spectra Type WP3C.
  - 2. American Safety Tread Co., Inc., Helena, AL; Type BF-311D and Type FA-311D.

## 2.10 SIDEWALK DOORS

- A. Load Capacity: 300 psf with maximum deflection of 1/150th of span. Provide H-20 wheel loading capacity where indicated on Drawings.
- B. Component Fabrication:
  - 1. Access Door Leaf(s): 1/4-inch aluminum diamond pattern plate. Provide stainless steel safety chain and attachments for end of double-leaf door assembly when open.
  - 2. Channel Frame: 1/4-inch-thick extruded aluminum trough frame with continuous anchor flange around perimeter. Weld 1-1/2-inch diameter drain coupling, and drain pipe, to frame trough at front right corner, unless indicated otherwise on Drawings.
  - 3. Safety Grate: Aluminum grating with 300 psf live load capacity, 5-inch by 5-inch grate openings, permanent hinging system that locks grate in 90-degree position, and opening arm with vinyl grip handle and locking device.

C. Door Hardware:

1. Hinges: Heavy-duty brass or stainless steel with stainless steel pins through-bolted to cover plate with tamper-proof stainless steel bolts flush with top of cover and to outside leg of channel frame with stainless steel bolts and locknuts.
2. Lifting Mechanism: Stainless steel compression lift springs enclosed in telescoping vertical housing or stainless steel torsion lift springs.
3. Hold-Open Arm:
  - a. Locks automatically in open position.
  - b. Disengages with slight pull on vinyl grip with one hand.
  - c. Door can be easily closed with one hand by pulling forward and down on vinyl grip.
4. Snap Lock:
  - a. Stainless steel snap lock mounted on bottom of door leaf with removable topside key wrench and inside fixed lever handle.
  - b. Threaded plug for flush outside surface with key wrench removed.

D. Aluminum: Mill finished with protective coating applied to surfaces to be in contact with concrete, as specified in Section 09 90 00, Painting and Coating.

E. Manufacturers and Products:

1. Bilco Co., New Haven, CT; J Series.
2. Nystrom Products Co., Minneapolis, MN; FG Series.
3. U.S.F. Fabrication, Hialeah, FL; T Series.
4. ITT Flygt Corporation, Trumbull, CT; FDRN Series.
5. Thompson Fabricating Co., Birmingham, AL; TE Series.
6. Halliday Products, Orlando, FL; WS Series.

2.11 FLOOR HATCHES

A. Load Capacity: 150 psf with maximum deflection of 1/150th of span.

B. Component Fabrication:

1. Access Door Leaf(s): 1/4-inch-thick aluminum diamond pattern plate. Provide stainless steel safety chain and attachments for end of double-leaf door assembly when open.
2. Angle Frame: 1/4-inch thick extruded aluminum angle frame with concrete anchors and integral neoprene gasket strip.



C. Door Hardware:

1. Hinges: Heavy-duty brass or stainless steel with stainless steel pins, through-bolted to cover plate with tamper-proof stainless steel bolts flush with top of cover and to outside leg of channel frame with stainless steel bolts and locknuts.
2. Lifting Mechanism: Stainless steel compression lift springs enclosed in telescoping vertical housing or stainless steel torsion lift springs.
3. Hold-Open Arm:
  - a. Locks automatically in open position.
  - b. Disengages with slight pull on vinyl grip with one hand.
  - c. Door can be easily closed with one hand by pulling forward and down on vinyl grip.
4. Snap Lock:
  - a. Stainless steel snap lock mounted on bottom of door leaf with removable topside key wrench and inside fixed lever handle.
  - b. Threaded plug for flush outside surface with key wrench removed.

D. Aluminum: Mill finished with protective coating applied to surfaces to be in contact with concrete, as specified in Section 09 90 00, Painting and Coating.

E. Manufacturers and Products:

1. Bilco Co., New Haven, CT; K Series.
2. Nystrom Products Co., Minneapolis, MN; FH Series.
3. U.S.F. Fabrication, Hialeah, FL; A Series.
4. ITT Flygt Corporation, Trumbull, CT; FLE Series.
5. Thompson Fabricating Co., Birmingham, AL; TI Series.
6. Halliday Products, Orlando, FL; SS Series.

2.12 HATCH SAFETY NET

A. General:

1. Conforms to ASSE A10.11 and OSHA CFR Part 1926.105.
2. Size to fit hatch opening where indicated.

B. Components and Accessories:

1. Rails and Slide Rings: Aluminum 6061-T6 extruded rails and aluminum-alloy 713.0 slide rings.
2. Corner Hooks and Eyebolts: AISI Type 316 stainless steel.
3. Netting: Polyester, 5-inch by 5-inch net openings; 5,000 pounds minimum breaking strength.
4. Bolts, Nuts, and Concrete Anchors: AISI Type 316 stainless steel.

C. Manufacturer and Product: Safe Approach Inc., Auburn, ME; Hatch Net 121.

## 2.13 LADDERS

- A. Fabricate ladders with rails, rungs, landings, and cages to meet applicable requirements of OSHA, 29 CFR 1910.23, and ALI A14.3.
  - 1. Design ladder for concentrated load of 200 pounds imposed by user concentrated at points that will cause maximum stress in structural member being considered.
  - 2. Include weight of ladder and attached appurtenances together with live load in design of rails and fastenings.
  - 3. Self-closing gates at landings.
- B. Flat Bar Ladder:
  - 1. Punch rails, pass rungs through rails, and weld on outside.
  - 2. Weld brackets to ladder for fastening ladder to wall.
  - 3. ASTM A276, AISI Type 304L and 316L stainless steel.
- C. Aluminum Pre-engineered Pipe Ladder:
  - 1. Rungs:
    - a. Aluminum extrusions of Alloy 6063-T6.
    - b. Nonslip grip surface, 1-inch wide flat top, and semicircular bottom with mill finish.
    - c. Diamondback, finish to match rails, as manufactured by Alcoa Building Products, Inc., Sidney, OH.
  - 2. Side Rails: ASTM B429/B429M, Alloy 6063-T6, 1-1/2 inches, Schedule 40 pipe with anodized finish, AA M32-C22-A41.
  - 3. Ladder Attachments and Cage Assembly Fasteners: Stainless steel.
  - 4. Welded, pop riveted, or glued construction is not acceptable.
  - 5. Fabricate to longest length as practical but not to exceed 24 feet.
  - 6. Furnish support attachments to side rails at 6 feet maximum spacing.
  - 7. Manufacturer: Thompson Fabricating Co. Inc., Tarrant, AL.
- D. Ladder Safety Post:
  - 1. Telescoping tubular, spring balanced and automatically locking in raised position, with release lever for unlocking.
  - 2. Post: Stainless steel, AISI Type 304.
  - 3. Hardware: Stainless steel, AISI Type 316.
  - 4. Furnish dissimilar metal protective coatings at connections.
  - 5. Manufacturer and Product: Bilco Co., New Haven, CT; "Ladder Up" to fit ladder rungs.

## 2.14 SAFETY CLIMB DEVICE

### A. General:

1. Conforms to ALI A14.3 and OSHA 29 CFR Part 1910.27.
2. Belt and harness shall withstand minimum drop test of 250 pounds in 6-foot free fall.
3. Fall Prevention System Material: Stainless steel, AISI Type 316.

### B. Components and Accessories:

1. Main Components: Sleeve or trolley, safety harness, and carrier or climbing rail.
2. Ladder rung clamps with stainless steel, AISI Type 316, mounting brackets and hardware.
3. Removable extension kit with tiedown rod or trolley gate, mandrel, and carrier rail for ladders under manholes and hatches.

### C. Manufacturers and Products:

1. Miller by Honeywell, Franklin, PA; Miller Saf-T-Climb.
2. TS Products, Cambridge, Ontario, Canada; TS Safety Rail System.

## 2.15 ALTERNATING STAIR TREADS

### A. Material:

1. Landings, Treads, and Foot Castings: Cast aluminum alloy F356F.
2. Handrails: Aluminum alloy 6063-T4, 1-1/2-inch by 1/8-inch tube.
3. Central Stringer: Aluminum alloy 6063-T52, 1-3/4-inch by 4-inch by 1/8-inch tube with rubber bumper strip.

### B. Treads: Skid-resistant with upturned integrally cast skid barriers.

### C. Risers: Equally spaced to within 3/16 inch for adjacent risers and to within 3/8 inch for nonadjacent risers.

### D. Handrails: Contoured for body guidance and underarm support, with supports positioned to allow free sliding of hands along rails.

### E. Foot Divider: Cast aluminum integral part of landing, which provides support for rubber bumper strip attached to central stringer.

### F. Stair Angle: 68 degrees from horizontal.

### G. Vertical Drop: As shown on Drawings.

- H. Finish: Natural aluminum finish.
- I. Manufacturer and Product: Lapeyre Stair, Inc., Harahan, LA; 68-Degree Alternating Tread Aluminum Stair.

2.16 LADDER CLIMB PREVENTION SHIELD

- A. Eight feet long with angled sides to within 2 inches of wall when closed.
- B. Furnish dissimilar metals protective coatings at bolted connections.
- C. Manufacturer and Product: North Safety Products, Specialty Products Division, Toronto, Ontario, Canada; Ladder Gate 770-000-001.

2.17 FABRICATED UNITS

- A. Chlorine Cylinder Trunnions: 3-ton, as manufactured by Chlorine Specialties, Inc., San Francisco, CA; Model C-256.
- B. Chlorine Cylinder Lift Beam:
  - 1. Maximum 13 inches from top of cylinder to hook hole.
  - 2. Hot-dip galvanize after fabrication.
  - 3. Manufacturers and Products:
    - a. Mansaver Industries, Inc., New Haven, CT; Style 1118.
    - b. Allied Steel Co., Inc., Los Angeles, CA.

2.18 MISCELLANEOUS

- A. Antiseizing Lubricant for Stainless Steel Threaded Connections:
  - 1. Suitable for potable water supply.
  - 2. Resists washout.
  - 3. Manufacturers and Products:
    - a. Bostik, Middleton, MA; Neverseez.
    - b. Saf-T-Eze Div., STL Corp., Lombard, IL; Anti-Seize.
- B. Neoprene Gasket:
  - 1. ASTM D1056, 2C1, soft, closed-cell neoprene gasket material, suitable for exposure to sewage and sewage gases, unless otherwise shown on Drawings.
  - 2. Thickness: Minimum 1/4 inch.
  - 3. Furnish without skin coat.
  - 4. Manufacturer and Product: Monmouth Rubber and Plastics Corporation, Long Branch, NJ; Durafoam DK1111LD.

## 2.19 FABRICATION

### A. General:

1. Finish exposed surfaces smooth, sharp, and to well-defined lines.
2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in neat, substantial manner.
3. Conceal fastenings where practical; where exposed, flush countersink.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Grind cut edges smooth and straight. Round sharp edges to small uniform radius. Grind burrs, jagged edges, and surface defects smooth.
6. Fit and assemble in largest practical sections for delivery to Site.

### B. Materials:

1. Use stainless steel shapes, unless otherwise noted.
2. Steel to be hot-dip galvanized: Limit silicon content to less than 0.04 percent or to between 0.15 percent and 0.25 percent.
3. Fabricate aluminum in accordance with AA Specifications for Aluminum Structures—Allowable Stress Design.
4. Stainless Steel Built-up Shapes: Fabricate built-up shapes in accordance with ASTM A1069/A1069M.

### C. Welding:

1. Weld connections and grind exposed welds smooth. When required to be watertight, make welds continuous.
2. Welded fabrications shall be free from twisting or distortion caused by improper welding techniques.
3. Steel: Meet fabrication requirements of AWS D1.1/D1.1M, Section 5.
4. Aluminum: Meet requirements of AWS D1.2/D1.2M.
5. Stainless Steel: Meet requirements of AWS D1.6/D1.6M.
6. Welded Anchor Studs: Prepare surface to be welded and weld with stud welding gun in accordance with AWS D1.1/D1.1M, Section 7, and manufacturer's instructions.
7. Complete welding before applying finish.

### D. Painting:

1. Shop prime steel with rust-inhibitive primer as specified in Section 09 90 00, Painting and Coating, unless otherwise indicated.

2. Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.
3. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.

E. Galvanizing:

1. Fabricate steel to be galvanized in accordance with ASTM A143/A143M, ASTM A384/A384M, and ASTM A385/A385M. Avoid fabrication techniques that could cause distortion or embrittlement of the steel.
2. Provide venting and drain holes for tubular members and fabricated assemblies in accordance with ASTM A385/A385M.
3. Remove welding slag, splatter, burrs, grease, oil, paint, lacquer, and other deleterious material prior to delivery for galvanizing.
4. Remove by blast cleaning or other methods surface contaminants and coatings not removable by normal chemical cleaning process in the galvanizing operation.
5. Hot-dip galvanize steel members, fabrications, and assemblies after fabrication in accordance with ASTM A123/A123M.
6. Hot-dip galvanize bolts, nuts, washers, and hardware components in accordance with ASTM A153/A153M. Oversize holes to allow for zinc alloy growth. Shop assemble bolts and nuts.
7. Galvanized steel sheets in accordance with ASTM A653/A653M.
8. Galvanize components of bolted assemblies separately before assembly. Galvanizing of tapped holes is not required.

F. Electrolytic Protection: Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.

G. Fitting: Where movement of fabrications is required or shown, cut, fit, and align items for smooth operation. Make corners square and opposite sides parallel.

H. Accessories: Furnish as required for a complete installation. Fasten by welding or with stainless steel bolts or screws.

## 2.20 SOURCE QUALITY CONTROL

- A. Visually inspect all fabrication welds and correct deficiencies.
  - 1. Steel: AWS D1.1/D1.1M, Section 6 and Table 6.1, Visual Inspection Acceptance Criteria.
  - 2. Aluminum: AWS D1.2/D1.2M.
  - 3. Stainless Steel: AWS D1.6/D1.6M.
  - 4. Hot-Dip Galvanizing:
    - a. An independent testing agency, will be retained by Owner.
    - b. Visually inspect and test for thickness and adhesion of zinc coating for minimum of three test samples from each lot in accordance with ASTM A123/A123M and ASTM A153/A153M.
    - c. Reject and retest nonconforming articles in accordance with ASTM A123/A123M and ASTM A153/A153M.

## PART 3 EXECUTION

### 3.01 INSTALLATION OF METAL FABRICATIONS

- A. General:
  - 1. Install metal fabrications plumb and level, accurately fitted, free from distortion or defects.
  - 2. Install rigid, substantial, and neat in appearance.
  - 3. Install manufactured products in accordance with manufacturer's recommendations.
  - 4. Obtain Engineer approval prior to field cutting steel members or making adjustments not scheduled.
  - 5. Do not remove mill markings from concealed surfaces.
  - 6. Remove inked or painted identification marks on exposed surfaces not otherwise coated after installed material has been inspected and approved.
  - 7. Snug-tighten bolts, unless otherwise specified.
- B. Steel: Fabrication, erection, connections, bolted and welded construction shall be in accordance with AISC Steel Construction Manual and AWS D1.1.
- C. Stainless Steel:
  - 1. Fabrication, erection, connections, bolted and welded construction shall be in accordance with AWS D1.6 and the following SSINA standards:
    - a. Specifications for Stainless Steel.
    - b. Stainless Steel Fabrication.
    - c. Stainless Steel Fasteners.
  - 2. Do not field weld unless approved by Engineer in writing.

D. Aluminum:

1. Do not remove mill markings from concealed surfaces.
2. Remove inked or painted identification marks on exposed surfaces not otherwise coated after installed material has been inspected and approved.

E. Fabrication, mechanical connections, and bolted construction shall be in accordance with the AA Aluminum Design Manual.

F. Pipe Sleeves: In accordance with Section 40 27 01, Process Piping Specialties.

G. Lintels and Shelf Angles: Provide as required for support of masonry and other construction not attached to structural steel framing, unless otherwise shown on Drawings.

3.02 CAST-IN-PLACE ANCHOR BOLTS

- A. Locate and hold anchor bolts in place with templates at time concrete is placed.
- B. Use anchor bolt sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt.
- C. Minimum Bolt Size: 1/2-inch diameter by 12 inches long, unless otherwise shown.

3.03 U-CHANNEL CONCRETE INSERTS

- A. Provide as indicated for pipe supports and where otherwise shown on Drawings.
- B. Except for interior dry areas, use plastic clips or similar dielectric material to isolate channel anchors from concrete reinforcing steel.

3.04 ABRASIVE NOSINGS

- A. Provide abrasive nosings on concrete steps not being supplied or coated with another type of nosing or nonskid material.

3.05 ACCESS COVERS

- A. Install access covers, including sidewalk doors, floor hatches, and hinged manhole covers in accordance with manufacturer's instructions.
- B. Accurately position prior to placing concrete, such that covers are flush with floor surface.



- C. Protect from damage resulting from concrete placement. Thoroughly clean exposed surfaces of concrete spillage to obtain a clean, uniform appearance.
- D. Route drain pipe to exterior face of concrete or as shown on Drawings.
- E. Position cover so that hinge is on side opposite ladder.

### 3.06 SAFETY CLIMB DEVICE SYSTEM

- A. Provide for each ladder where unbroken height between levels exceeds 24 feet, or at lesser height where indicated on Drawings.
- B. Install in accordance with manufacturer's instructions.
- C. Furnish additional accessories required to complete system for each ladder.
- D. Furnish one harness for each ladder equipped with safety climb device.
- E. Furnish pivot section at platforms, landings, and roofs.
- F. When installed to required height, fall prevention system shall be rigid and an integral part of the structure.

### 3.07 ELECTROLYTIC PROTECTION

- A. Aluminum and Galvanized Steel:
  - 1. Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.
  - 2. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.
  - 3. Allow coating to dry before installation of the material.
  - 4. Protect coated surfaces during installation.
  - 5. Should coating become marred, prepare and touch up in accordance with paint manufacturer's written instructions.
- B. Titanium: Where titanium equipment is in contact with concrete or dissimilar metal, provide full-face neoprene insulation gasket, 3/32-inch minimum thickness and 70-durometer hardness.
- C. Stainless Steel:
  - 1. During handling and installation, take necessary precautions to prevent carbon impregnation of stainless steel members.

2. After installation, visually inspect stainless steel surfaces for evidence of iron rust, oil, paint, and other forms of contamination.
3. Remove contamination using cleaning and passivation methods in accordance with requirements of ASTM A380 and ASTM A967.
4. Brushes used to remove foreign substances shall utilize only stainless steel or nonmetallic bristles.
5. After treatment, visually inspect surfaces for compliance.

### 3.08 PAINTING

- A. Painted Galvanized Surfaces: Prepare as specified in Section 09 90 00, Painting and Coating.
- B. Repair of Damaged Hot-Dip Galvanized Coating:
  1. Conform to ASTM A780/A780M.
  2. For minor repairs at abraded areas, use sprayed zinc conforming to ASTM A780/A780M.
  3. For flame cut or welded areas, use zinc-based solder, or zinc sticks, conforming to ASTM A780/A780M.
  4. Use magnetic gauge to determine thickness is equal to or greater than base galvanized coating.
- C. Field Painting of Shop Primed Surfaces: Prepare surfaces and field finish in accordance with Section 09 90 00, Painting and Coating.

### 3.09 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance:
  1. In accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on Drawings in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing.
  2. Contractor responsibilities and related information on special inspection, observation, and testing are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control:
  1. Inspection and testing required in Section 01 45 16.13, Contractor Quality Control.
  2. Manufacturer's Certificate of Compliance per Section 01 61 00, Common Product Requirements, for test results, or calculations, or drawings that ensure material and equipment design and design criteria meet requirements of Section 01 61 00, Common Product Requirements and Section 01 88 15, Anchorage and Bracing.

## 3.10 FASTENER SCHEDULE

A. Unless indicated otherwise on Drawings, provide fasteners as follows:

<b>Service Use and Location</b>	<b>Product</b>	<b>Remarks</b>
<b>1. Anchor Bolts Cast Into Concrete for Structural Steel, Metal Fabrications and Castings</b>		
Interior Dry Areas	Stainless steel headed anchor bolts, unless indicated otherwise	
Exterior and Interior Wet Areas	Stainless steel headed anchor bolts	
Submerged and Corrosive Areas	Stainless steel headed anchor bolts with fusion bonded coating	See Section 09 90 00, Painting and Coating
<b>2. Anchor Bolts Cast Into Concrete for Equipment Bases</b>		
Interior Dry Areas	Stainless steel headed anchor bolts, unless otherwise specified with equipment	
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel headed anchor bolts with fusion bonded coating, unless otherwise specified with equipment	See Section 09 90 00, Painting and Coating
<b>3. Post-Installed Anchors: See Section 05 05 19, Post-Installed Anchors</b>		
<b>4. Anchors Cast in Grout-Filled Concrete Masonry Units</b>		
Dry Areas	Stainless steel headed anchor bolts or stainless steel sleeve anchors	
Exterior and Interior Wet Areas	Stainless steel headed anchor bolts, or stainless steel sleeve anchors	

<b>Service Use and Location</b>	<b>Product</b>	<b>Remarks</b>
<b>5. Connections for Structural Steel Framing</b>		
Exterior and Interior Wet and Dry Areas	High-strength steel bolted connections	Use hot-dipped galvanized high-strength bolted connections for galvanized steel framing members.
<b>6. Connections of Aluminum Components</b>		
Submerged, Exterior and Interior Wet and Dry Areas	Stainless steel bolted connections, unless otherwise specified with equipment	
<b>7. All Others</b>		
Exterior and Interior Wet and Dry Areas	Stainless steel fasteners	

B. Antiseizing Lubricant: Use on stainless steel threads.

**END OF SECTION**

**SECTION 05 52 16  
ALUMINUM RAILINGS**

**PART 1      GENERAL**

**1.01      REFERENCES**

A.    The following is a list of standards which may be referenced in this section:

1.    Aluminum Association, Incorporated (AA): DAF45, Designation System for Aluminum Finishes.
2.    American Concrete Institute (ACI) 318, Building Code Requirements for Structural Concrete.
3.    American Iron and Steel Institute (AISI).
4.    ASTM International (ASTM):
  - a.    A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
  - b.    A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
  - c.    E894, Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
  - d.    E935, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
  - e.    E985, Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.
5.    International Code Council (ICC): International Building Code (IBC).
6.    Occupational Safety and Health Act (OSHA): 29 CFR 1910, Code of Federal Regulations.

**1.02      DEFINITIONS**

- A.    ICC Evaluation Services Report: ICC report on evaluation of manufactured concrete anchor systems.
- B.    Railings: This term includes guardrail systems, handrail systems, platform railing systems, ramp-rail systems, and stair-rail systems. Railings may be comprised of a framework of vertical, horizontal, or inclined members, grillwork or panels, accessories, or combination thereof.

- C. Special Inspection: As defined by the ICC IBC.
- D. Toeboards: Vertical barrier at floor level usually erected on railings along exposed edges of floor or wall openings, platforms, or ramps to prevent miscellaneous items from falling through.

### 1.03 DESIGN REQUIREMENTS

- A. Structural Performance of Railing Systems: Design, test, fabricate, and install railings to withstand the following structural loads without exceeding allowable design working stress or allowable deflection. Apply each load to produce maximum stress and deflection in railing system components.
  - 1. Railing System: Capable of withstanding the following load cases applied:
    - a. Concentrated load of 200 pounds applied at any point and in any direction in accordance with ICC IBC and OSHA.
    - b. Uniform load of 50 pounds per linear foot applied in any direction in accordance with ICC IBC.
    - c. Concentrated load need not be assumed to act concurrently with uniform loads in accordance with ICC IBC.
  - 2. In-Fill Area of Railing Systems:
    - a. Capable of withstanding a horizontally applied normal load of 50 pounds applied to 1 square foot at any point in system including panels, intermediate rails, balusters, and openings and space between railings.
    - b. Horizontal concentrated load need not be assumed to act concurrently with loads on top rails of railings.
  - 3. Calculated lateral deflection at top of posts shall not exceed 1 inch.

### 1.04 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Project-specific scaled plans and elevations of railings and detail drawings. Include railing profiles, sizes, connections, anchorage, size and type of fasteners, and accessories.
  - 2. Samples:
    - a. Rail sections, 6 inches long showing each type of proposed connection, proposed finish, and workmanship.
    - b. Each fitting including wall brackets, castings, toeboard, and rail expansion joints.

B. Informational Submittals:

1. Manufacturer's assembly and installation instructions.
2. Special Inspection: Manufacturer's instructions for Special Inspection of post-installed anchors.
3. Design Data: Calculations or test data using specified design performance loads and including the following:
  - a. Bending stress in, and deflection of, posts in accordance with ASTM E985 as modified herein.
  - b. Design of post base connection.
  - c. Manufacturer's literature and catalog data of railing and components.
    - 1) Documentation that concrete anchors have been designed in accordance with one of the following:
      - a) ACI 318.
      - b) ICC Evaluation Services Report for selected anchor.
4. Test Reports: Test data may supplement load calculations providing data covers complete railing system, including anchorage:
  - a. Test data for railing and components showing load and deflection as a result of load, in enough detail to prove railing is strong enough and satisfies national, state, local standards, regulations, code requirements, and OSHA 29 CFR 1910, using design loads specified. Include test data for the following:
    - 1) Railing and post connections.
    - 2) Railing wall connections.
    - 3) Railing expansion joint connections.
    - 4) Railing system gate assembly, including latch, gate stop, and hinges. Both gate latch and stop to support required loads applied independent of each other.
    - 5) Railing picket panel clamps and connections.
  - b. Testing of anchorages shall be in accordance with ASTM E894 and ASTM E935 using applied loads in accordance with ICC IBC.
  - c. Deflection Criteria: In accordance with ASTM E985 and design loads specified, except as follows: maximum calculated lateral deflection at top of posts shall not exceed 1 inch.
  - d. Aluminum Rail Piping: Test data showing yield strength of pipe as delivered equals or exceeds specified values.
5. Manufacturer's written recommendations describing procedures for maintaining railings including cleaning materials, application methods, and precautions to be taken in use of cleaning materials.

1.05 QUALITY ASSURANCE

- A. Qualifications: Calculations required for design data shall be stamped by a registered civil or structural engineer licensed in state where Project will be constructed.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package and wrap railings to prevent scratching and denting during shipment, storage, and installation. Maintain protective wrapping to the extent possible until railing is completely installed.
- B. Delivery:
  - 1. Shop assemble into practical modules of lengths not exceeding 24 feet for shipment.
  - 2. Deliver toeboards loose for field assembly.
  - 3. Deliver clear anodized railing pipe and posts with protective plastic wrap.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Thermal Movements: Allow for thermal movement resulting from the following maximum range in ambient temperature in design, fabrication, and installation of railings to prevent buckling, opening up of joints, over stressing of components, connections and other detrimental effects. Base design calculation on actual surface temperature of material as a result of both solar heat gain and night time sky heat loss. Temperature change is difference between high or low temperature and installation temperature.
  - 1. Temperature Change Range: 70 degrees F, ambient; 100 degrees F, material surfaces.

**PART 2 PRODUCTS**

2.01 ALUMINUM RAILINGS

- A. General:
  - 1. Furnish pre-engineered and prefabricated railing systems as shown on Drawings.
  - 2. Railing systems using pop rivets or glued railing construction are not permitted.
  - 3. Sand cast accessories and components are not permitted.
  - 4. Fasteners shall be AISI Type 316 stainless steel, unless otherwise noted.



B. Rails, Posts, and Formed Elbows:

1. Extruded Alloy 6105-T5, 6061-T6, or equivalent.
2. Tensile Strength: 38,000 psi, minimum.
3. Yield Strength: 35,000 psi, minimum.
4. Wall Thickness: 0.145 inch, minimum.
5. Posts and railings shall be nominal 1-1/2-inch diameter (1.90-inch outside diameter).

C. Accessories:

1. Fittings and Accessories:
  - a. Extruded, machined bar stock, permanent mold castings, or die castings of sufficient strength to meet load requirements.
  - b. Gauge metal components are not acceptable for load-resisting components.
  - c. Fittings shall match color of pipe in railings.
2. Miscellaneous Extruded Aluminum Parts: Alloys 6063-T6, 6061-T6, or 6105 T5 aluminum, or equivalent, and of adequate strength for all loads.
3. Castings for Railings:
  - a. Cast Al-mag with sufficient strength to meet load and test requirements.
  - b. Anodizable grade finish with excellent resistance to corrosion when subjected to exposure of sodium chloride solution intermittent spray and immersion.
4. Post Anchorages:
  - a. Refer to standard details for types of post anchorages and minimum requirements.
  - b. Bolts at anchorages shall be minimum 1/2-inch diameter.
5. Wall Brackets: Adjustable wall fitting, with provision for minimum three 3/8-inch diameter AISI Type 316 stainless steel bolts or concrete anchors.
6. Rail Terminals (including Wall Returns): Aluminum wall fitting with provision for three 3/8-inch Type 304 fasteners.
7. Railing System Gate:
  - a. Extruded aluminum rail components.
  - b. Hardware Manufacturers and Products:
    - 1) Julius Blum & Co., Inc., Carlstadt, NJ; No. 782/3 gate hinges with springs, and No. 784 gate latch and stop.
    - 2) CraneVeyor Corp., South El Monte, CA; No. C4370b gate hinges with spring, No. C4369 gate latch, and No. C4368 gate stop.
    - 3) Moultrie Manufacturing Co., Moultrie, GA; Part No. W60006.

8. Railing Picket Panels and Clamps:
    - a. 1/2-inch Schedule 40 aluminum pipe (picket).
    - b. Extruded aluminum 1-1/2-inch by 7/8-inch by 1/8-inch channel.
    - c. Furnish neoprene plug for each end of picket.
    - d. Fasteners: Stainless steel.
  9. Toeboards:
    - a. Molded or extruded Alloy 6063-T6 or 6061-T6 aluminum.
    - b. Provide slotted holes for expansion and contraction where required.
  10. Fasteners: Stainless steel.
- D. Metal Supports Embedded in Concrete: In accordance with Section 05 50 00, Metal Fabrications.
- E. Finishes:
1. Pipe and Post: In accordance with AA DAF45, designation AA-M32-C22-A41.
  2. Cast Fittings and Toeboards: In accordance with AA DAF45, designation AA-M10-C22-A41.

## 2.02 ANCHOR BOLTS, FASTENERS, AND CONCRETE ANCHORS

- A. Locknuts, Washers, and Screws:
1. Elastic Locknuts, Steel Flat Washers, Round Head Machine Screws (RHMS): AISI Type 316 stainless steel.
  2. Flat Washers: Molded nylon.
- B. Bolts and Nuts for Bolting Railing to Metal Beams: ASTM A193/A193M and ASTM A194/A194M, Type 316 stainless steel.
- C. Concrete Anchors:
1. Stainless steel, AISI Type 316.
  2. Post-installed anchors in accordance with Section 05 50 00, Metal Fabrications, unless otherwise specified herein.
  3. Bolt Diameter: 1/2-inch, minimum.

## 2.03 FABRICATION

### A. Shop Assembly:

1. Post Spacing: Maximum 6-foot horizontal spacing.
2. Railing Posts Bolted to Metal or Concrete:
  - a. In lieu of field cutting, provide approved fitting with sufficient post overlap, containing provisions for vertical adjustment.
  - b. Field fit-up is required.
3. Free of burrs, nicks, and sharp edges when fabrication is complete.
4. Welding is not permitted.

### B. Shop/Factory Finishing:

1. Use same alloy for uniform appearance throughout fabrication for railings.
2. Railing and Post Fittings: Match fittings with color of pipe in railing.

### C. Shop Assembly:

1. Shop assemble rails, posts, and formed elbows with a close tolerance for tight fit.
2. Fit dowels tightly inside posts.

### D. Repair of Defective Work: Remove stains and replace defective Work.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Field fabrication of aluminum railing systems is not permitted.
- B. Where required, provide railing posts longer than needed and field cut to exact dimensions required in order to satisfy vertical variations on actual structure.
- C. Install railing with base that provides plus or minus 1/4-inch vertical adjustment inside base fitting. If adjustment is required in field and exceeds plus or minus 1/4-inch, reduce post length not to exceed beyond bottom of lowest set-screw or bolt in base fitting.
- D. Modification to supporting structure is not permitted where railing is to be attached.

- E. Mount railings only on completed walls. Do not support railings temporarily by means not satisfying structural performance requirements.
- F. Protection from Entrapped Water:
  - 1. Make provisions in exterior and interior installations subject to high humidity to drain water from railing system.
  - 2. For posts mounted in concrete, bends, and elbows occurring at low points, drill weep holes of 1/4-inch diameter at lowest possible elevations, one hole per post or rail. Drill hole in plane of rail.

### 3.02 RAILING INSTALLATION

- A. Assembly and Installation: Perform in accordance with manufacturer's written recommendations for installation.
- B. Expansion Joints:
  - 1. Maximum intervals of 54 feet on center and at structural joints.
  - 2. Slip joint with internal sleeve extending 2 inches beyond each side of joint. Provide 1/2-inch slip joint gap to allow for expansion.
  - 3. Fasten to one side using 3/8-inch diameter set-screw. Place set-screw at bottom of pipe.
  - 4. Locate joints within 12 inches of posts. Locate expansion joints in rails that span expansion joints in structural walls and floors supporting the posts.
- C. Posts and Rails:
  - 1. Surface Mounted Posts:
    - a. Bolt post baseplate connectors firmly in place.
    - b. Shims, wedges, grout, and similar devices for railing post alignment not permitted.
  - 2. Set posts plumb and aligned to within 1/8 inch in 12 feet.
  - 3. Set rails horizontal or parallel to slope of steps to within 1/8 inch in 12 feet.
  - 4. Install posts and rails in same plane.
  - 5. Remove projections or irregularities and provide a smooth surface for sliding hands continuously along top rail.
  - 6. Use offset rail for use on stairs and platforms if post is attached to web of stringers or structural platform supports.
  - 7. Support 1-1/2-inch rails directly above stairway stringers with offset fittings.

- D. Wall Brackets: Support wall rails on brackets spaced maximum 5 feet on centers as measured on the horizontal projection.
- E. Toeboard:
  - 1. Provide at railings, except where 4-inch or higher concrete curbs are installed, at gates, or at stairways unless shown otherwise.
  - 2. Accurately measure in field for correct length; after railing post installation cut and secure to posts.
  - 3. Dimension between bottom of toeboard and walking surface not to exceed 1/4 inch.
  - 4. Install plumb and aligned to within 1/8 inch in 12 feet.
- F. Railing System Gate: Install in accordance with manufacturer's installation instructions.

### 3.03 FIELD FINISHING

- A. Corrosion Protection: Prevent galvanic action and other forms of corrosion caused from direct contact with concrete and dissimilar metals by coating metal surfaces as specified in Section 09 90 00, Painting and Coating.

### 3.04 FIELD QUALITY CONTROL

- A. Post-installed anchors supporting railing systems require special inspection.
- B. Owner-Furnished Quality Assurance, in accordance with ICC IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Drawings.
- C. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16.13, Contractor Quality Control.

### 3.05 CLEANING

- A. Wash railing system thoroughly using clean water and soap. Rinse with clean water.
- B. Do not use acid solution, steel wool, or other harsh abrasive.
- C. If stain remains after washing, restore in accordance with railing manufacturer's recommendations or replace stained railings.

## END OF SECTION



**SECTION 05 53 00  
METAL GRATINGS**

**PART 1 GENERAL**

**1.01 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
1. American Association of State Highway and Transportation Officials (AASHTO): Standard Specifications for Highway Bridges.
  2. ASTM International (ASTM):
    - a. A36/A36M, Standard Specification for Carbon Structural Steel.
    - b. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
    - c. 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. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  3. National Association of Architectural Metal Manufacturers (NAAMM):
    - a. MBG 531, Metal Bar Grating Manual.
    - b. MBG 532, Heavy-Duty Metal Bar Grating Manual.

**1.02 SUBMITTALS**

- A. Action Submittals:
1. Shop Drawings:
    - a. Grating: Show dimensions, weight, size, and location of connections to adjacent grating, supports, and other Work.
    - b. Grating Anchorage: Show details of anchorage to supports to prevent displacement from traffic impact.
    - c. Product data for grating, grating clips, anchors, accessories, and other manufactured products specified herein.
    - d. Manufacturer's specifications, including coatings, surface treatment, and finishes.
- B. Informational Submittals:
1. Special handling and storage requirements.
  2. Installation instructions.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Insofar as is practical, factory assemble items.
- B. Package and clearly tag parts and assemblies that are, due to necessity, shipped unassembled.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

- A. Materials, equipment, and accessories specified in this section shall be products of:
  - 1. Alabama Metal Industries Corporation (AMICO), Birmingham, AL.
  - 2. HARSCO Industrial IKG, Houston, TX.
  - 3. Ohio Gratings, Inc., Canton, OH.

2.02 GRATING MATERIALS

- A. Aluminum: Provide alloy and temper as designated below.
  - 1. Bearing Bars and Banding: ASTM B221 alloy 6061-T6 or 6063-T6.
  - 2. Swaged Crossbar Rods: ASTM B221 alloy 6061 or 6063, or ASTM B210 alloy 3003.
  - 3. Finish: Mill.
- B. Stainless Steel:
  - 1. Bearing Bars, Banding, and Cross Bars: ASTM A666, Type 304L and 316L
  - 2. Finish: Mill.

2.03 METAL BAR GRATING

- A. General Requirements:
  - 1. Maximum Service Load:
    - a. Light Duty (Type A): 100 psf uniformly distributed load.
  - 2. Maximum Deflection: Span/240 or 1/4 inch, whichever is less.
  - 3. Bearing Bar Spacing:
    - a. Light Duty: 1-3/16 inch maximum, center-to-center.
  - 4. Cross Bar Spacing: 4 inches maximum, center-to-center. For aluminum I-bar grating with depths greater than 2 inches, provide cross bars at 2 inches maximum, center-to-center.
  - 5. Bearing Bars, Cross Bars and Banding: Minimum thickness as specified in NAAMM MBG 531 or as shown on Drawings.



- B. Grating Materials: Aluminum, pressure-locked rectangular bar grating fabricated by pressing crossbars between rectangular bearing bars.
- C. Surface: Slip resistant, consisting of an applied abrasive finish of aluminum-oxide aggregate.
- D. Stair Treads:
  - 1. Material and Type: Same as grating material and grating type as furnished for connecting walkway or work surface.
  - 2. Nosings: Integral ribbing and serrated edge on one long axis of tread, or nonslip abrasive on each tread along one long edge.
  - 3. Carrier Plate or Angle: Furnish at each end for connection to stair stringers.

#### 2.04 HEAVY-DUTY METAL BAR GRATING (TYPE C)

- A. General Requirements:
  - 1. Maximum Service Load: AASHTO H-20.
  - 2. Maximum Deflection: Span/240.
  - 3. Bearing Bar Spacing: 1-7/8 inch maximum center-to-center.
  - 4. Cross Bar Spacing: 4 inches maximum center-to-center.
  - 5. Bearing Bars, Cross Bars and Banding: Minimum thickness as specified in NAAMM MBG 532 or as shown on Drawings.
  - 6. Grating Type: Galvanized steel, heavy-duty, rectangular bar grating fabricated by welding crossbars between rectangular bearing bars pressing deep rectangular crossbars into slots in rectangular bearing bars.

#### 2.05 ACCESSORIES

- A. Embedded Frames:
  - 1. As indicated on Drawings and as specified in Section 05 50 00, Metal Fabrications.
  - 2. Type 316 L Stainless steel frames as manufactured by:
    - a. Ohio Gratings, Inc., Canton, OH.
    - b. Thompson Fabricating, LLC, Tarrant, AL.
- B. Grating Clamps:
  - 1. Use at flanged beam and bolted angle frame supports.
  - 2. Removable from above grating walkway surface.

3. Provide hat bracket, recessed bolt, and bottom clamp of same material as grating.
4. Manufacturers and Products:
  - a. Direct Metals Company, LLC, Kennesaw, GA; Grating Clamp.
  - b. Grating Fasteners, Inc., Harvey, LA; G-Clip.

C. Anchor Stud and Saddle Clip:

1. Use at embedded angle frame supports with stud anchor and nut recessed below top of grating surface.
2. Removable from above grating walkway surface.
3. Provide Type 316 stainless steel welded threaded stud anchor, nut, washer, and saddle clip.
4. Manufacturers and Products:
  - a. Welded Stud Anchor:
    - 1) Nelson Stud Welding, Inc., Elyria, OH.
    - 2) Stud Welding Associates, Inc. Elyria, OH.
  - b. Saddle Clip:
    - 1) Direct Metals Company, LLC, Kennesaw, GA; Saddle Clip.
    - 2) Grating Fasteners, Inc., Harvey, LA; Saddle Clip.
    - 3) Struct-Fast, Inc., Baltimore, MD; Gratefast.

2.06 FABRICATION

A. General:

1. In accordance with NAAMM MBG 531 or NAAMM MBG 532.
2. Do not weld aluminum grating.
3. Conceal fastenings where practical.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Cutouts:
  - a. Fabricate in grating sections for penetrations indicated.
  - b. Arrange to permit grating removal without disturbing items penetrating grating.
  - c. Edge band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.
6. Do not notch bearing bars at supports to maintain elevation.
7. Field measure areas to receive grating. Verify dimensions of new fabricated supports, and fabricate to dimension required for specified clearances.

8. Section Length: Sufficient to prevent section from falling through clear opening when oriented in the span direction and one end is touching either the concrete or the vertical leg of grating support.
  9. Minimum Bearing: 1 inch for grating depth up to 2-1/4 inches and 2 inches for grating depth greater than 2-1/4 inches.
  10. Banding and Toe Plates: Same material as grating and welded to bearing bars in accordance with requirements of NAAMM MBG 531 and NAAMM MBG 532.
- B. Metal Bar Grating: A single grating section shall be not less than 1.5 feet or greater than 3 feet in width, or weigh more than 150 pounds.
- C. Heavy Duty Metal Bar Grating: Minimum width of grating sections shall be 2 feet regardless of length and weight.
- D. Supports:
1. Same material as grating, except that supports which are to be embedded in concrete shall be Type 316 stainless steel, unless part of an extruded aluminum system.
  2. Coordinate dimensions and fabrication with grating to be supported.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Electrolytic Protection:
1. Protect aluminum surfaces in contact with dissimilar metals, or embedded or in contact with masonry, grout, or concrete as specified in Section 09 90 00, Painting and Coating.
  2. Allow paint to dry before installation of material.

#### **3.02 INSTALLATION**

- A. Until grating sections are securely fastened in place, area shall be appropriately barricaded or flagged to alert people working in the area of potential fall hazard.
- B. Install manufactured products in accordance with manufacturer's recommendations.
- C. Install supports such that grating sections have a solid bearing on both ends, and that grating sections will not rock or wobble under design loads.
- D. Install grating supports plumb and level as applicable.

- E. Install sections of welded frames with anchors to straight plane without offsets.
- F. Field locate and install fasteners to fit grating layout.
- G. Anchor grating securely to supports using minimum of four fastener clips and bolts per grating section.
- H. Each grating or plank section shall be easily removable and replaceable.
- I. Completed installation shall be rigid and neat in appearance.
- J. Protect painted and galvanized surfaces during installation.
- K. Repair damaged coatings as specified in Section 09 90 00, Painting and Coating.

**END OF SECTION**

**SECTION 06 10 00  
ROUGH CARPENTRY**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    American Wood Preservers' Association (AWPA):
    - a.    U1, User Specification for Treated Wood.
    - b.    M4, Standard for the Care of Preservative-Treated Wood Products.
  2.    APA - The Engineered Wood Association (APA):
    - a.    PRP-108, Performance Standards and Qualification Policy for Structural-Use Panels (Form E445).
    - b.    Form B445, APA Quality Assurance Policies for Structural-Use Panels Qualified to PRP-108.
  3.    ASTM International (ASTM):
    - a.    A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - b.    E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
    - c.    F1667, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
  4.    International Code Council (ICC).
  5.    National Fire Protection Association (NFPA): 255, Standard Method of Test of Surface Burning Characteristics of Building Materials.
  6.    Underwriters' Laboratories, Inc. (UL): 723, Standard for Safety Test for Surface Burning Characteristics of Building Materials.
  7.    U.S. Department of Commerce—Product Standards (DOC): PS 1, Structural Plywood.

**1.02      SUBMITTALS**

- A.    Action Submittals:
1.    Product Data:
    - a.    Construction panels.
    - b.    Metal framing anchors.
    - c.    Construction adhesives.
    - d.    Construction panel thickness where not shown.

**B. Informational Submittals:**

1. ICC Evaluation Service Reports, including the following as a minimum:
  - a. Connections and Fasteners.
  - b. Wood Treatment.
2. Wood treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material.
3. Material test reports from testing laboratory showing and interpreting test results in accordance with test methods UL 723, NFPA 255, and ASTM E84, relative to fire-retardant treated wood products.

**1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Immediately upon delivery to Site, place materials in area protected from weather. Do not store seasoned materials in wet or damp areas.
- B. Protect sheet materials from breaking corners and damaging surfaces while unloading.
- C. Store materials a minimum of 6 inches above ground on framework or blocking and cover with waterproof covering, providing for adequate air circulation and ventilation. Store sheet materials flat, not on edge.
- D. Protect fire-retardant materials against high humidity and moisture during storage and erection.
- E. Store materials for which a maximum moisture content is specified in areas where humidity can be controlled.

**PART 2 PRODUCTS**

**2.01 GENERAL**

- A. Each plywood panel identified with designated grade trademark of APA.

**2.02 CONSTRUCTION PANELS**

- A. Plywood:
  1. General:
    - a. Where construction panels are shown on Drawings for the following concealed types of applications, provide APA Performance-Rated Panels complying with requirements designated under each application for grade designation, span rating, exposure durability classification, edge detail, and thickness.

- b. Construction Panel Standards: Comply with DOC PS 1 for plywood construction panels and for products not manufactured under DOC PS 1 provisions, in accordance with APA PRP-108 and APA Form B445.
  - c. Trademark: Each construction panel factory-marked with APA trademark evidencing compliance with grade requirements.
- B. Composite Wall Panels (FRP Faced Plywood Sheathing):
  - 1. APA rated Plywood sheathing.
  - 2. Fiberglass Reinforced Plastic (FRP) laminated to plywood substrate. Texture: Pebbled. Color: White.
  - 3. Manufactured by NuFiber or equal.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify surfaces to receive rough carpentry materials are prepared to exact grades and dimensions.

#### **3.02 GENERAL**

- A. Lay out, cut, fit, and install rough carpentry items. Anchor sufficiently to ensure rigidity and permanence.
- B. Install items accurate to dimension, true to line, level, and square unless shown otherwise on Drawings. Provide for installation and support of other Work.
- C. Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.
- D. Make provisions for temporary construction loads and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

### **END OF SECTION**





**SECTION 06 40 00**  
**ARCHITECTURAL MILLWORK**

**PART 1      GENERAL**

**1.01      INCLUDED IN THIS SECTION**

A.    Dewatering and Control Building:

1.    Breakroom kitchen cabinets.
2.    Training Room cabinets.

**1.02      REFERENCES**

A.    The following is a list of standards which may be referenced in this section:

1.    Architectural Woodwork Institute (AWI): Architectural Woodwork Quality Standards.
2.    ASTM:
  - a.    ASTM D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  - b.    ASTM D5420, Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
  - c.    ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  - d.    ASTM E228, Standard Test Method for Linear Thermal Expansion of Solid Materials with a Push-Rod Dilatometer.
3.    Builders Hardware Manufacturers Association (BHMA):
  - a.    201, Cabinet Hardware.
  - b.    156.11, Cabinet Locks.
4.    Federal Specifications (FS): MMM-A-130B, Adhesive, Contact.
5.    National Electrical Manufacturers' Association (NEMA): LD 3, High-Pressure Decorative Laminates.
6.    Product Standards (PS)-U.S. Department of Commerce: 51-71, Hardwood and Decorative Plywood.
7.    Woodwork Institute of California (WIC): Manual of Millwork.

## 1.03 SUBMITTALS

### A. Action Submittals:

1. Shop Drawings: Mandatory.
  - a. Show details and dimensions not controlled by job conditions and required field measurements. Sections through each special function portion of Millwork item.
  - b. Describe and illustrate all features of design showing field measurements, construction details, dimensions, materials, hardware and finish. Use full-size or 1/4-size scale Drawings. Reference Shop Drawings to Contract Document Drawings.
  - c. Furnish manufacturer's descriptive literature of specialty items not manufactured by woodwork manufacturer.
2. Samples:
  - a. Finished Samples of each finish to be applied by woodwork manufacturer.
  - b. Sample casework unit complete with hardware, including locks and accessories, and top. Unit may be incorporated in the Work.

### B. Informational Submittals:

1. Proof of woodwork manufacturer qualifications.
2. Written confirmation of compliance to AWI standard required.

## 1.04 QUALITY ASSURANCE

### A. Manufacturer's Qualifications:

1. Successful completion of comparable work on similar size project within 2 years before start of construction on this Project.
2. Current member of Architectural Woodwork Institute.
3. Architect reserves right to approve woodwork manufacturer selected to furnish work.

### B. Casework and Paneling: "Quality Standards" of Architectural Woodwork Institute (AWI).

1. Reference to Premium, Custom, or Economy Grade: As defined in AWI "Quality Standards."
2. Provide Custom Grade unless otherwise specified.

### C. Cabinet Hardware: In accordance with BHMA 201 and BHMA 156.11.

### D. Work in this section shall be accomplished under the Quality Certification Program of the Architectural Woodwork Institute (AWI).

1.05 ENVIRONMENTAL REQUIREMENTS

- A. For a minimum of 72 hours prior to installation, allow woodwork to come to equilibrium onsite in space where it is to be installed.
- B. Humidity: For 24 hours before, during, and after installation, maintain relative humidity between 25 and 55 percent.
- C. Temperature: For 24 hours before, during, and after installation, maintain ambient temperature between 65 and 75 degrees F.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Defer delivery to the Project Site until the installation and storage areas are complete and dry of all wet type construction, and excessive moisture has been out of the building for at least 10 days.
- B. Protect casework and paneling from damage and dampness. Store in weathertight, well-ventilated areas. Do not subject to extreme changes of temperature or humidity.

**PART 2 PRODUCTS**

2.01 CASEWORK WITH PLASTIC LAMINATE FINISH

- A. Meet the requirements of AWI Quality Standards Section 400 for laminate clad cabinets.
- B. Furnish casework exposed surfaces, including top, edges, front face, and backsplashes, with plastic laminate in colors indicated in Interior Finish Schedule.

2.02 CASEWORK HARDWARE

- A. Concealed Hinges: Stanley No. 1511 or Knappe and Vogt No. 2661; No. 626 finish.
- B. Catches: Stanley No. 46 or McKinney No. 2911; 628 aluminum finish, magnetic.
- C. Pivot Door Slides: Knappe and Vogt No. 8085, medium duty.
- D. Pulls/Handles: Solid brass or bronze, Stanley No. 4484, Baldwin No. 4676; 626 satin chrome finish.
- E. Heavy-Duty Drawer Slides: Knappe and Vogt No. 1429 or Grant No. 4930.

- F. Shelf Supports: Knappe and Vogt No. 255/256 or Grant No. 120/121, nickel-plated finish.
- G. Shelf and Rod Support: Stanley No. 7046 or Knappe and Vogt No. 1194.
- H. Heavy-Duty Pivot Door Slides: HAWA-Turnaway 35/X3, pivot sliding door fitting.

2.03 PLASTIC LAMINATE

- A. Cabinets/Backsplashes/Counter Tops: Manufacturer and color as indicated in Color List Schedule on the Drawings.
- B. No unfinished surfaces of casework, cabinets, backsplash, or table are to be exposed.
- C. See Drawings for requirements of the Millwork.

2.04 ANCILLARY MATERIALS

- A. Adhesives:
  - 1. For Plastic Laminate: Contact cement; Federal Specification MMM-A-130B.
- B. Woodwork Putty: Color to match finish.
- C. Fasteners: Furnish as necessary.

2.05 FABRICATION

- A. Moisture Content: Prior to fabrication, lumber shall be kiln-dried to an average moisture content range as follows:
  - 1. Exterior Work: 9 to 12 percent.
  - 2. Interior Work: 6 to 11 percent.
- B. Casework Construction: AWI Quality Standards Custom Grade, flush overlay.
- C. Casework Fronts: Plastic laminate.
- D. Casework Units: Shop assembled for field installation.
- E. Install concealed hinges on doors.

- F. Drawer Slides: Use side-mounted, heavy-duty type.
- G. Install casework hardware in accordance with manufacturer's instructions.
  - 1. Provide items where indicated and as required for a complete installation.
  - 2. Provide pulls and catches on casework doors unless indicated otherwise.
  - 3. Coordinate with Section 08 30 00, Access Doors (Floor Access Doors and Plastic Laminate Sliding Door Hardware).

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Field verification of field dimensions to be made by millworker prior to commencement of fabrication.
- B. Examine grounds, stripping, and blocking for cabinet attachment.
- C. Do not proceed to install until conditions are acceptable to installer.
- D. Verify that surfaces to receive architectural woodwork items are properly prepared.

#### **3.02 CASEWORK INSTALLATION**

- A. Coordinate installation of, and cut openings for mechanical, electrical, and other items that penetrate casework surfaces and tops.
- B. Install all casework in true alignment, level, and plumb.
- C. Secure units with nails or screws to cleats that have been anchored to building structure or wall framing.
- D. Install wall-hung cabinets to rigidly support cabinet weight plus normally expected weight of cabinet contents.
- E. Accurately scribe and closely fit faceplates, filler strips, and trim strips to irregularities of adjacent surfaces.

- F. Adhere plastic laminate as recommended by the laminate manufacturer.
  - 1. Apply with as few cross joints as possible and no longitudinal joints.
  - 2. Scribe neatly to vertical surfaces.
- G. Toe Space at Front of Cabinets: Provide by installing front face of cabinets 3 inches in front of base face.

3.03 ADJUSTING AND CLEANING

- A. Adjust hardware and leave in smooth working condition.
- B. Adjust doors and drawers to operate without restriction.
- C. Surfaces: Clean and ready for use.

**END OF SECTION**

**SECTION 07 21 00  
THERMAL INSULATION**

**PART 1      GENERAL**

**1.01      REFERENCES**

A.    The following is a list of standards which may be referenced in this section:

1.    ASTM International (ASTM):
  - a.    C272/C272M, Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions.
  - b.    C303, Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
  - c.    C612, Standard Specification for Mineral-Fiber Block and Board Insulation.
  - d.    C665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  - e.    E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  - f.    E96/E96M, Standard Test Methods for Water Vapor Transmission of Materials.

**1.02      SUBMITTALS**

A.    Action Submittals:

1.    Shop Drawings:
  - a.    Manufacturer's product literature identifying products proposed for use.
  - b.    Drawings or letter indicating proposed locations of holes for injection of foam-in-place insulation in exposed, unpainted walls.

**1.03      DELIVERY, STORAGE, AND HANDLING**

- A.    On packaging clearly identify manufacturer, contents, brand name, applicable standard, and R-value.
- B.    Store materials off ground and keep them dry. Protect against weather, condensation, and damage.

## **PART 2      PRODUCTS**

### **2.01      BATT INSULATION AND FASTENERS**

- A.    Fiberglass or Mineral Wool Batts:
  - 1.    ASTM C665, II, Class C, with 1.0 perm rating, nonreflective kraft paper vapor-resistant membrane laminated to one side.
  - 2.    Manufacturers:
    - a.    CertainTeed Corp.
    - b.    Owens-Corning Insulating Systems.
    - c.    Johns Manville.
- B.    Foam-in-Place Insulation:
  - 1.    R-Value at 1 Inch Thickness: 4.6, minimum.
  - 2.    Foam Density: 0.72 pounds per cubic foot.
  - 3.    Surface Burning Characteristics, ASTM E84:
    - a.    Flame Spread: 25, maximum.
    - b.    Smoke Developed: 200, maximum.
  - 4.    Water Vapor Transmission: 17 perms, maximum.
  - 5.    Manufacturers and Products:
    - a.    cfiFoam, Inc.; Core Foam Masonry Foam Insulation.
    - b.    C.P. Chemical Co., Inc.; Tripolymer PRMIU or 105.
    - c.    cfiFoam, Inc.; Insulsmart MH.
    - d.    Air krete, Inc.; Airkrete.
    - e.    K-13 by International Cellulose Corporation.

### **2.02      RIGID INSULATION**

- A.    Expanded Polystyrene Foam:
  - 1.    ASTM C578, Type IX.
  - 2.    Flame Spread: Less than 25 when tested in accordance with ASTM E84.
  - 3.    R-value: R-11 min.
  - 4.    Manufacturers and Products:
    - a.    Atlas EPS, Atlas Roofing Corp.; ThermalStar.
    - b.    ACH Foam Technologies; Foam-Control Plus+.
- B.    Adhesives and Fasteners: As recommended by insulation manufacturer.
- C.    Mineral Fiber:
  - 1.    Thermal Conductivity ("K") Value: 0.26, maximum.
  - 2.    Flame Spread: 25 or less when tested in accordance with ASTM E84.
  - 3.    Fuel Contribution: 15 or less.



4. Smoke Developed Rating: 10 or less.
5. Color: White with minimum light reflectance of 70 percent where exposed.
6. Manufacturers and Products:
  - a. Monoglass, Inc.; Monoglass Spray-On Insulation.
  - b. Isolatek International; Cafco Heat-Shield.

## **PART 3 EXECUTION**

### **3.01 BATT INSULATION**

A. Install in accordance with manufacturer's instructions and as specified below:

1. Install in widths required by framing spacing with vapor retarder facing warm side.
2. Fit tightly to ensure continuous seal. Tape overlapping flanges of vapor retarder when necessary, using tape as recommended by insulation manufacturer.
3. Where electrical outlets, ducts, pipes, vents, or other utility items occur, place insulation on cold weather side of obstruction.
4. Protect installed insulation from tears and other damage until covered with finish material.
5. Remove and replace damaged material.
6. Install ventilation baffles between trusses as recommended by manufacturer.

### **3.02 MASONRY FILL INSULATION**

A. Foam-in-Place Insulation:

1. Inject foam into ungrouted cells of concrete masonry units through holes drilled in mortar joints at interior and exterior face of wall in accordance with manufacturer's instructions. Locate holes in inconspicuous locations, as approved by Engineer.
2. Upon completion, clean excess foam from face of masonry in accordance with manufacturer's instructions.
3. Fill and patch holes with mortar in accordance with Section 04 22 00, Concrete Unit Masonry.

### **3.03 RIGID INSULATION**

A. Install in accordance with the following:

1. Install boards in location and in R-value as specified.
2. Cut insulation with saw, knife, or other sharp tool to fit tightly around obstructions.
3. Butt insulation boards together tightly at joints.

4. Where thickness required exceeds 1-1/2 inches, install two layers of boards.
5. Apply to masonry or concrete with adhesive recommended by insulation manufacturer:
  - a. Adhere first layer to substratum, then adhere second layer to first, staggering joints.
  - b. Follow manufacturer's recommendations for preparing surfaces and applying adhesive.

3.04 SPRAY-ON INSULATION

- A. Surface Preparation: Free of dirt, grease, oil, loose paint, excessive rust scale, or other foreign material, which would prevent adequate adhesion.
- B. Ambient Temperature: Between 40 degrees F and 155 degrees F throughout application process.
- C. Application:
  1. Mix, apply, and finish in accordance with manufacturer's instructions for monolithic blanket of uniform texture.
  2. Blanket Thickness: Minimum 2 inches.

**END OF SECTION**

**SECTION 07 26 16**  
**UNDERSLAB VAPOR RETARDERS**

**1.01 REFERENCES**

A. The following is a list of standards which may be referenced in this section:

1. American Concrete Institute (ACI): 302, Guide for Concrete Floor and Slab Construction.
2. ASTM International (ASTM):
  - a. D412, Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
  - b. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
  - c. D903, Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
  - d. D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
  - e. D3767, Standard Practice for Rubber – Measurement of Dimensions.
  - f. D4833, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
  - g. E96/E96M, Standard Test Methods for Water Vapor Transmission of Materials.
  - h. E154, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or a Ground Cover.
  - i. E1643, Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
  - j. E1745, Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
  - k. F1249, Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

**1.02 SUBMITTALS**

A. Action Submittals: Manufacturer's material specifications including cut sheets.

B. Informational Submittals:

1. MSDS for proposed materials.
2. Manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Services.
3. Manufacturer's written instructions for preparation, installation/application, repair, protection and maintenance.
4. Manufacturer's Certification of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Services.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's instructions. Protect from damage from weather, excessive temperature and construction operations. Remove and dispose of damaged material in accordance with applicable regulations.

**PART 2 PRODUCTS**

2.01 APPLICATION

- A. The following building first floor slab on grade will have vapor retarder:
1. Dewatering Building.
  2. Chlorine Building.

2.02 UNDERSLAB VAPOR RETARDER

- A. Meet or exceed ASTM E1745, Class A, with the following properties:
1. Water Vapor Permeance: 0.03 perm maximum when tested in accordance with ASTM E96/E96M or ASTM F1249.
  2. Tensile Strength: 45-foot-pounds per inch minimum, when tested in accordance with ASTM D882.
  3. Puncture Resistance: 2,200 grams minimum, when tested in accordance with ASTM D1709.
  4. Thickness: 10 mils minimum, in accordance with ACI 302.
- B. Manufacturers and Products:
1. Fortifiber Building Systems Group; Moistop Ultra 10.
  2. Reef Industries, Inc.; Griffolyn 10 mil Green.
  3. Stego Industries, LLC; Stego Wrap Class A Vapor Retarder.

2.03      **ANCILLARY MATERIALS**

- A.    Fasteners, Tape, Adhesive, or Sealant: As recommended by vapor retarder manufacturer.
- B.    Pipe Boots: Manufacturer's recommended prefabricated or field fabricated item.

**PART 3      EXECUTION**

3.01      **PREPARATION**

- A.    Examine conditions of substrates and other conditions under which work is to be performed. Do not proceed with work until satisfactory conditions are obtained.

3.02      **INSTALLATION**

- A.    Underslab Vapor Retarder:
  - 1.    Apply in accordance with manufacturer's instructions.
  - 2.    After base for slab has been leveled and tamped, apply vapor retarder with roll width parallel to direction of concrete pour.
  - 3.    Lap vapor retarder over footings and seal to foundation walls.
  - 4.    Overlap joints 6 inches and seal with tape.
  - 5.    Seal penetrations with pipe boots.
  - 6.    Repair damaged areas with patches of vapor retarder, overlapping damaged area by 6 inches and sealing sides of patch with tape.

3.03      **CLEANING**

- A.    Upon completion of vapor retarder installation, remove waste materials and debris resulting from this operation and dispose offsite.

**END OF SECTION**



**SECTION 07 52 16**  
**THERMOPLASTIC MEMBRANE ROOFING**

**PART 1      GENERAL**

**1.01      SUMMARY**

- A.    Section includes insulation, and membrane roofing, base flashings, metal flashings, and roofing membrane expansion joints.

**1.02      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
  - 1.    American Society of Civil Engineers (ASCE) - ASCE 7-10 Minimum Design Loads for Buildings and Other Structures.
  - 2.    ANSI/ASHRAE/IESNA Standard 9.1 (2007): Energy Standard for Buildings Except Low-Rise Residential Buildings.
  - 3.    ANSI/SPRI WD-1 “Wind Design Standard for Roofing Assemblies”.
  - 4.    ASTM International (ASTM):
    - a.    ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
    - b.    ASTM D4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
    - c.    ASTM D6878 - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
  - 5.    National Roofing Contractors Association: NRCA Low Slope Roofing and Waterproofing Manual.
  - 6.    Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA): Architectural Sheet Metal Manual.
  - 7.    Underwriters Laboratories Inc. (UL):
    - a.    790, Standard Test Methods for Fire Tests of Roof Coverings.
    - b.    TGFU R1306: Roofing Systems and Materials Guide.

**1.03      DESIGN CRITERIA**

- A.    Wind Uplift Performance: Roof system is designed to withstand wind uplift forces as calculated using the current revision of ASCE-7 10.
- B.    Thermal Performance: Roof system will achieve an average R value not less than 20.
- C.    Building Codes: Roof system will meet the requirements of all federal, state and local code bodies having jurisdiction.

## 1.04 SUBMITTALS

### A. Product Data:

1. Manufacturer's data sheets on each product to be used, including:
  - a. Preparation instructions and recommendations.
  - b. Storage and handling requirements and recommendations.
  - c. Installation methods.
2. Detail Drawings:
  - a. Submit approved plan, section, elevation or isometric drawings which detail the appropriate methods for all flashing conditions found on the Project.
  - b. Coordinate approved Drawings with locations found on the Contract Drawings.

### B. Color Samples: Provide physical samples of Manufacturer's full range of standard colors for Kyar 500 finish for selection by Owner/Engineer.

### C. Informational Submittals:

1. Letter or other documentation from roofing materials manufacturer stating that installer has been trained and approved to apply roof system.
2. Sample copy of guarantee to be provided.
3. Record of Preroofing Conference.
4. Inspection reports for inspections conducted by membrane manufacturer's representative; include written instructions or recommendations as conditions to special guarantee.
5. Operation and Maintenance Data:
  - a. As specified in Section 01 78 23, Operating and Maintenance Data.
  - b. Include sketches where applicable, recommendations for periodic inspection, care, and maintenance.
  - c. Identify common causes of damage with instructions for temporary patching until permanent repair can be made.
6. Manufacturer's Certificate of Proper Installation.
  - a. The Certificate shall be completed in full, signed by entity supplying the product, material, or service, and submitted prior to shipment of product or material or execution of the services.
  - b. Engineer may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.
  - c. Such form shall certify proposed product, material, or service complies with that specified. Attach supporting reference data, affidavits, and certifications as appropriate.
  - d. May reflect recent or previous test results on material or product, if acceptable to Engineer.



1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of 15 years of experience.
- B. Installer Qualifications:
  - 1. All products listed in this section are to be installed by a single installer with a minimum of 5-years demonstrated experience in installing products of the same type and scope as specified.
  - 2. Installer must be capable of providing the Manufacturer's No Dollar Limit guarantee.

1.06 PREROOFING CONFERENCE

- A. Conference Requirements:
  - 1. Attendees: Engineer, roofing installer, roofing manufacturer, installers of related Work, and other entities concerned with roofing performance included, where applicable, Owner's insurer, test agencies, governing authorities, and Owner.
  - 2. Agenda: Follow outline in NRCA's Waterproofing Manual. Include acceptability of deck, roofing system, materials, manufacturer's specifications selected, flashing details, roof guarantee, and protection of furnished roofing system.
  - 3. Documentation: Record discussion and agreements. Furnish copy to each attendee invited.
- B. Membrane manufacturer's inspections as required to meet conditions of guarantee.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in their original, unopened containers, clearly labeled with manufacturer's name, brand name, and such identifying numbers as are appropriate.
- B. Storage:
  - 1. Store materials at temperatures between 60 degrees F and 80 degrees F. Should they be exposed to lower temperatures, restore to 60 degrees F prior to use.
  - 2. Store rigid roof insulation materials on clean, raised platform.
  - 3. Do not store uncured flashing membrane on roof or at temperatures exceeding 75 degrees F.

4. Store products in manufacturer's unopened packaging until ready for installation.
  5. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.
- C. Protect materials against wetting, moisture absorption, and construction traffic.
- D. Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage and application of materials.
- E. When loading materials onto the roof, the Carlisle Authorized Roofing Applicator must comply with the requirements of the building owner to prevent overloading and possible disturbance to the building structure.

#### 1.08 ENVIRONMENTAL REQUIREMENTS

- A. Weather: Do not install roofing during precipitation or when it is probable.
- B. Temperature: Install roofing when ambient temperature is 50 degrees F or above. When temperature is below 50 degrees F, install only with approval or and under supervision of membrane manufacturer.

#### 1.09 COORDINATION

- A. Coordinate Work with installation of associated roof penetrations and metal flashings, as Work of this section proceeds.

#### 1.10 PROJECT CONDITIONS

- A. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the Work to proceed in accordance with the manufacturer's requirements and recommendations.
- B. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.
- C. Provide protection, such as 3/4-inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.

- D. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.
- E. New roofing shall be complete and weather tight at the end of the workday.
- F. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

#### 1.11 WARRANTY

- A. At Project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's No Dollar Limit, Total System warranty, outlining its terms, conditions, and exclusions from coverage:
  - 1. Duration: 20 years.
  - 2. Coverage to be extended to include accidental puncture repair in accordance with terms stated in the Warranty document, at no additional charge.
  - 3. Coverage to be extended to include a reflectivity warranty that will maintain a minimum of Energy Star rating, for not less than 10 years from Project completion.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Basis of Design: Carlisle SynTec Sure Weld FleeceBack TPO.
- B. Substitutions: Any and all substitution requests must be submitted a minimum of 10 days prior to bid date. Any product substitutions must meet the same uplift pressure performance as the basis of design product. Any substitutions must be accompanied by written confirmation by the roof system manufacturer to comply with all aspects of the NDL warranty, as stated in paragraph 1.11 of this Specification.

#### 2.02 SCOPE/APPLICATION

- A. Roof System: Provide a waterproof roof system, capable of withstanding uplift forces as specified in the Design Criteria article of this section.
  - 1. Membrane Attachment: Fully Adhered.
  - 2. Insulation Attachment: Fully Adhered.

- B. Base Flashing: Provide a waterproof, fully adhered base flashing system at all penetrations, plane transitions and terminations.
- C. Insulation: Provide a roof insulation system beneath the finish membrane.

## 2.03 INSULATION

- A. Polyisocyanurate HP-H: Rigid board with fiber reinforced facers on both sides, meeting or exceeding the requirements of ASTM C1289, Carlisle HPH.
  - 1. Compressive Strength: 20 psi (138 kPa).
  - 2. Density: 2 pounds per cubic foot (24 kg/cu m) minimum.

## 2.04 INSULATION ADHESIVE

- A. FAST 100 or 100 LV Adhesive: A spray or extruded applied, two-component polyurethane, low-rise expanding foam adhesive used for attaching approved insulations to compatible substrates (concrete, cellular lightweight insulating concrete, gypsum, cementitious wood fiber, wood or steel).

## 2.05 THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE

- A. Sure-Weld FleeceBACK Membrane: TPO membrane with a 55-mil fleece bonded to the underside.
  - 1. Color: White.
  - 2. Membrane Thickness: 115 mil nominal / 60 mil over fleece.
  - 3. Sheet Dimensions:
    - a. Width: 6 or 12 feet.
    - b. Length: 100 feet.
  - 4. Performance:
    - a. Breaking Strength: FB 115 – 400 (1.8 kN) minimum.
    - b. Tear Strength: 55 lbf/in (245 N/m) minimum.
    - c. Elongation: 25 percent.

## 2.06 FLASHING ACCESSORIES

- A. Inside Corners: Pre-molded corner flashing for inside corners. 60 mil thickness. Color to match membrane.
- B. Outside Corners: Injection molded corner used for flashing outside corners. 60 mil thickness. Color to match membrane.
- C. TPO T-Joint Covers: Injection molded 60 mil thick TPO formed into a 4.5-inch diameter circle used to seal step-offs at splice intersections.

- D. Molded Pipe Seals: A pre-molded flashing and clamping ring used for pipe penetrations. Available for 0.75 inch to 8-inch diameter pipes. Color to match membrane.
- E. Split Pipe Seals: Pre-fabricated flashing consisting of 45 mil thick reinforced Sure-Weld Membrane for pipes 1 inch to 6 inch in diameter. A split (cut) and overlapped tab is incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration.
- F. Pressure-Sensitive Cover Strip: A nominal 6-inch wide by 40 mil thick non-reinforced TPO membrane laminated to nominal 35-mil thick cured synthetic rubber pressure-sensitive adhesive. Used in conjunction with TPO Primer to strip in flat metal flanges (i.e., drip edges or rows of fasteners and plates).
- G. Non-Reinforced Flashing: Non-reinforced TPO flashing is a 60-mil thick non-reinforced TPO based membrane used for detail work where the use of pre-molded or pre-fabricated accessories is not feasible. Color – White.

## 2.07 CLEANERS, PRIMERS, ADHESIVES AND SEALANTS

- A. FAST 100 or 100-LV Adhesive: A spray or extruded applied, two-component, polyurethane, low-rise expanding foam adhesive used to securely bond FleeceBACK membranes to a variety of substrates.
- B. Cut Edge Sealant: A medium solids content, free flowing polymeric material designed for sealing cut edges (exposed fabric) of Sure-Weld reinforced membrane.
- C. Water Cut-Off Mastic: A one-component, low viscosity, self-wetting, Butyl blend mastic used as a compression sealing agent between membrane and applicable substrates.
- D. Low VOC Primer: Manufacturer's recommended low VOC primer.
- E. TPO Primer: Solvent-based product designed to prepare TPO membrane for improved adhesion to TPO surfaces prior to the application of pressure-sensitive products and sealant pockets.
- F. Universal Single-Ply Sealant: A 100 percent solids, solvent free, VOC free, one-part polyether sealant that provides a weather tight seal to a variety of building materials. It is used for general caulking such as above termination bars and metal counter flashings and at scupper details. Available in white only.

- G. Thermoplastic One-Part Sealant: Single component, moisture curing, elastomeric polyether sealant that is compatible with Carlisle's Thermoplastic membranes. Provides a flexible, durable and long lasting seal around hard-to-flash penetrations in Thermoplastic Roofing Systems.
- H. Carlisle Weathered Membrane Cleaner: Clear, solvent-based cleaner used to loosen and remove contaminants from the surface of exposed membrane.
- I. 702 Primer: A single component, solvent based, high tack primer used to provide maximum adhesion between Carlisle 725 Air & Vapor Barrier and an approved substrate. Applied by spray or long nap roller with a coverage rating ranging from approximately 250 square feet per gallon on smooth finishes (i.e., concrete) to 75 square feet per gallon on porous surfaces (i.e., DensDeck Prime gypsum board). Available in 5-gallon containers.

## 2.08 FASTENING COMPONENTS

- A. Edge metal must be supplied by the roof system manufacturer and included in the NDL roof system warranty. Field or shop fabricated metal is not permitted.
- B. SecurSeal Drip Edge Fascia: A 22-gauge pre-punched 90-degree angle cleat and 12-foot long fascia sections.
- C. Sure-Weld Coated Metal: 4 foot by 10 foot coated metal sheets made from 24-gauge galvanized steel with a minimum .035-inch thick non-reinforced Sure-Weld laminate. Sure-Weld membrane can be welded directly to the Sure-Weld Coated Metal in accordance with the manufacturer's detail. Color to match membrane.
- D. Galvanized steel finish: Kynar 500.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

- C. Do not commence work until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment.
- D. A vapor retarder / temporary roof (Carlisle 725 TR Air & Vapor Barrier/ Temporary Roof) may be applied to protect the inside of the structure prior to the roof system installation.

### 3.03 INSULATION - SYSTEM DESIGN

- A. Provide an adhered tapered insulation system that will achieve an average value of R25 with a 1/4 inch per foot slope.
- B. Base Layer:
  - 1. Type: Polyisocyanurate.
  - 2. Thickness: 1.5 inches.
  - 3. Attachment Method: Adhered.
- C. Tapered System:
  - 1. Type: Polyisocyanurate.
  - 2. Field Slope: 1/4 inch per foot.
  - 3. Attachment Method: Adhered.

### 3.04 INSULATION PLACEMENT

- A. Install insulation in multiple layers over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch. Stagger joints both horizontally and vertically if multiple layers are provided.
- B. Do not install wet, damaged or warped insulation boards.
- C. Stagger joints in one direction unless joints are to be taped. Install insulation boards snug. Gaps between board joints shall not exceed 1/4 inch. Fill all gaps in excess of 1/4 inch with same insulation material.
- D. Wood nailers must be at least 3-1/2 inches wide or 1-inch wider than adjacent metal flange. Thickness must equal that of insulation but not less than 1-inch thickness.
- E. Miter and fill the edges of the insulation boards at ridges, valleys and other changes in plane to prevent open joints or irregular surfaces. Avoid breaking or crushing of the insulation at the corners.
- F. Do not install any more insulation than will be completely waterproofed each day.

### 3.05 INSULATION ATTACHMENT

- A. Install insulation layers, maximum 4 feet by 4 feet, applied with adhesive, coverage rate shall be no less than 6-inch o.c. beads or 1 gallon per square. Press each board firmly into place after adhesive develops strings when touched, typically 1-1/2 to 2 minutes after adhesive was applied, and roll with a minimum 100-pound weighted roller. Add temporary weight and use relief cuts to ensure boards are well adhered. Stagger the joints of additional layers by a minimum of 6 inches.

### 3.06 MEMBRANE PLACEMENT AND ATTACHMENT

- A. Position and unroll successive sheets and align to provide for a minimum 3-inch wide splice.
- B. Fold adjacent sheets in half lengthwise to expose an approximate 12-foot wide substrate area.
- C. Membrane which will have the adjacent sheet spliced over it should be adhered to the substrate first. In this fashion, selvage edge splice area will not be contaminated by setting splice edge into the FAST Adhesive.
- D. Spray or extrude FAST Adhesive onto the substrate and allow to foam up approximately 1/8 inch. Wait for the adhesive to achieve "string" when a small object is lifted out of the adhesive. Coverage rate shall be minimum of 6-inch o.c. beads or 1 gallon per square.
- E. Place the membrane into adhesive after adhesive develops strings when touched, typically 1-1/2 to 2 minutes after adhesive was applied, and roll with a minimum 100-pound weighted roller.
- F. Apply FAST Adhesive to the substrate and continue process described above until all sheets are fully bonded, allowing for necessary splice overlaps at selvage edges. At end laps (along the width of the sheet) membrane shall be butted together which will be overlaid with 6-inch wide Sure-Weld Reinforced Membrane hot air welded along all edges. Pressure-Sensitive Cover strip is not permitted in this situation.

### 3.07 SEAM WELDING

- A. Hot-air weld membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's current guidelines. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.
- B. Overlay all splice intersections with Sure-Weld T-Joint Cover.



- C. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).
- D. Repair all seam deficiencies the same day they are discovered.
- E. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete. Cut Edge Sealant is not required on vertical splices.

### 3.08 FLASHING

- A. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using Sure-Weld reinforced membrane or prefabricated accessories. Sure-Weld non-reinforced membrane may be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded or prefabricated accessories is not feasible.
- B. Follow manufacturer's typical flashing procedures for all penetration flashing including metal edging applications.

### 3.09 DAILY SEALS

- A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the workday, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
- B. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.

### 3.10 CLEAN UP

- A. Perform daily cleanup to collect all wrappings, empty containers, paper, and other debris from the Project Site. Upon completion, all debris must be disposed of in a legally acceptable manner.
- B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

### 3.11 PROTECTION

- A. Protect installed products until completion of Project.
- B. Touchup, repair or replace damaged products before Substantial Completion.

## **END OF SECTION**



**SECTION 07 62 00**  
**SHEET METAL FLASHING AND TRIM**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    ASTM International (ASTM):
    - a.    B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
    - b.    C920, Standard Specification for Elastomeric Joint Sealants.
    - c.    C1311, Standard Specification for Solvent Release Sealants.
    - d.    D1187/D1187M, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
    - e.    D4586/D4586M, Standard Specification for Asphalt Roof Cement, Asbestos-Free.
  2.    Federal Specifications (FS): QQ-L-201F(2), Lead Sheet.
  3.    FM Global (FM): Loss Prevention Data Sheet 1-49, Perimeter Flashing.
  4.    Sheet Metal and Air Conditioning Contractors National Association (SMACNA): 1793, Architectural Sheet Metal Manual.

**1.02      PERFORMANCE REQUIREMENTS**

- A.    General: Sheet metal flashing and trim shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B.    Thermal Movements:
1.    Provide sheet metal flashing and trim that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures for preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
    - a.    Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.
  2.    Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements.
  3.    Base engineering calculation on surface temperatures of materials as a result of both solar heat gain and nighttime-sky heat loss.
- C.    Water Infiltration: Provide sheet metal flashing and trim that does not allow water infiltration to building interior.

1.03 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA 1793. Conform to dimensions and profiles shown, unless more stringent requirements are indicated.

1.04 DESIGN REQUIREMENTS

- A. Wind Loads: Provide sheet metal and trim assemblies and their anchorage to the building structure that are capable of withstanding the positive and negative wind load pressures shown on the Components and Cladding Wind Surface Pressures table on the Structural Drawings.

1.05 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Show joints, types and location of fasteners, and special shapes.
    - b. Catalog data for stock manufactured items.
  - 2. Samples: Color Samples for items to be factory finished.
- B. Informational Submittals: Third party testing documentation or manufacturer's literature qualifying sheet metal and trim assemblies and their anchorage to the building structure as meeting the required developed wind pressures for Project as shown on the Components and Cladding Wind Surface Pressures table on the Structural Drawings.

1.06 DELIVERY, HANDLING, AND STORAGE

- A. Inspect for damage, dampness, and wet storage stains upon delivery to Site.
- B. Remove and replace damaged or permanently stained materials that cannot be restored to like-new condition.
- C. Carefully handle to avoid damage to surfaces, edges, and ends.
- D. Do not open packages until ready for use.
- E. Store materials in dry, weathertight, ventilated areas until immediately before installation.

**1.07 SPECIAL GUARANTEE**

- A. Product: Furnish manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as Special Guarantee. Special Guarantee shall provide for correction or, at the option of the Owner, removal and replacement of factory-applied fluoropolymer coating, finish, and accessories found defective during a period of 20 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in General Conditions.
- B. Conditions:
  - 1. Finish: No cracking, blistering, flaking, chipping, checking, chalking, peeling, or fading.
  - 2. All Components: Watertight and weathertight with normal usage.

**PART 2 PRODUCTS**

**2.01 METAL**

- A. Prefinished Aluminum Sheet: ASTM B209, alloy and temper as required for application and finish: 0.032-inch thick; mill finish; shop precoated with fluoropolymer coating (Kynar polyvinylidene fluoride resin) coating; color as selected from manufacturer's standard color range.

**2.02 REGLETS AND COUNTERFLASHING**

- A. For Concrete:
  - 1. Stainless steel, 0.015 inch.
  - 2. Manufacturers and Products:
    - a. Fry Reglet Corp.; Fry Springlok Type CO and Springlok Flashing.
    - b. Cheney Flashing Co.; Type A reglet and Snap Lock Cap Flashing.

**2.03 PREFABRICATED METAL SYSTEMS**

- A. Coping System:
  - 1. Snap-on system, stucco embossed pattern aluminum, 0.050-inch minimum thickness.
  - 2. Include ancillary items, such as mitered and welded corners, and end caps, where shown and as required for complete system.
  - 3. Manufacturers and Products:
    - a. W.P. Hickman Co.; Permasnap Coping.
    - b. Johns Manville; Presto Lock Coping System.

- B. Finish: Factory finished with full strength fluoropolymer coating (Kynar polyvinylidene fluoride resin) in color as indicated in Exterior Finish Schedule.

#### 2.04 GUTTERS, DOWNSPOUTS, SCUPPERS, AND CONDUCTOR HEADS

- A. Fabricated from prefinished aluminum sheet specified in this section.

#### 2.05 ANCILLARY MATERIALS

- A. Sealing Tape: Polyisobutylene sealing tape specifically manufactured for setting flanges on bituminous roofing.
- B. Isolation Paint: ASTM D1187/D1187M, asphalt.
- C. Isolation Tape: Butyl or polyisobutylene, internally reinforced, or 20-mil thick minimum polyester.
- D. Plastic Roof Cement: ASTM D4586/D4586M, Type II.
- E. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- G. Fasteners:
  - 1. Aluminum Work: Stainless steel or aluminum.
  - 2. Stainless Steelwork: Stainless steel.

#### 2.06 FABRICATION OF FLASHING

- A. Field measure prior to fabrication.
- B. Fabricate in accordance with SMACNA 1793 that applies to design, dimensions, metal, and other characteristics of item indicated.
- C. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- D. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

- E. Seams:
  - 1. Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- F. Reinforcements and Supports: Provide same material as flashing, unless other material is shown. Steel, where shown or required, shall be galvanized or stainless.
- G. Rigid Joints and Seams: Make mechanically strong. Seal aluminum joints with sealant.
- H. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- I. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with butyl sealant concealed within joints.
- J. Fabricate sheet metal in 10-foot maximum lengths, unless otherwise indicated.
- K. Provide watertight closures at exposed ends of counterflashing.
- L. Fabricate corners in one-piece with legs extending 30 inches each way to field joint. Lap, rivet, or solder corner seams watertight. Apply sealant if necessary.
- M. Solvent clean sheet metal. Surfaces to be in contact with roofing or otherwise concealed shall be coated with isolation paint.
- N. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- O. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
  - 1. Thickness: As recommended by SMACNA 1793 and FM Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

**2.07 FABRICATION OF DOWNSPOUTS, GUTTERS, SCUPPERS, AND CONDUCTOR HEADS**

- A. Form downspouts and gutters in maximum lengths as practicable to sizes and shapes indicated on Drawings:
  - 1. Telescope end joints 1-1/2 inches and lock longitudinal joints of downspouts.
  - 2. Provide elbows at bottom where downspouts empty onto splash blocks.
  - 3. Fit downspouts into cast iron boots or drainpipes where indicated on Drawings; neatly caulk or cement joints.
- B. Form scuppers and conductor heads to shapes and sizes indicated on Drawings.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set and cant strips and reglets in place.
- B. Verify nailing strips and blocking are properly located.
- C. Verify membrane termination and base flashings are in place, sealed, and secure.

**3.02 INSTALLATION**

- A. Flashing:
  - 1. General:
    - a. Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA 1793.
    - b. Provide concealed fasteners where possible, set units true to line, and level as indicated.
    - c. Install work with laps, joints, and seams that will be permanently watertight.
  - 2. Isolate metal from wood and concrete and from dissimilar metal with isolation tape or two coats of isolation paint.
  - 3. Use only stainless steel fasteners to connect isolated dissimilar metals.
  - 4. Joints: 10-foot maximum spacing and 2-1/2 feet from corners, butted with 3/16-inch space centered over matching 8-inch long backing plate with sealing tape in laps.



5. Set flanges of flashings and roof accessories on continuous sealing tape or in plastic roof cement on top of envelope ply of roofing. Nail flanges through sealing tape and at 3-inch maximum spacing. Touch up isolation paint on flanges.
  6. Joints, Fastenings, Reinforcements, and Supports: Sized and located as required to preclude distortion or displacement as a result of thermal expansion and contraction.
  7. Provide continuous holddown clips at counterflashing and gravel stops.
  8. Conceal fastenings wherever possible.
  9. Set flashing and sheet metal to straight, true lines with exposed faces aligned in proper plane without bulges or waves.
- B. Downspouts, Scuppers, and Conductor Heads: Anchor downspouts to wall with straps of same material as downspouts. Install scuppers, and conductor heads as indicated on Drawings.

### 3.03 FINISH

- A. Exposed Surfaces of Flashing and Sheet Metalwork: Free of dents, scratches, abrasions, or other visible defects, and clean and ready for painting where applicable.

### 3.04 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

## END OF SECTION



**SECTION 07 70 01**  
**ROOF SPECIALTIES AND ACCESSORIES**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    Air Movement and Control Association International (AMCA).
  2.    American Architectural Manufacturers Association (AAMA).
  3.    ASTM International (ASTM):
    - a.    D1187, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
    - b.    D4586, Standard Specification for Asphalt Roof Cement, Asbestos-Free.
  4.    FM (Factory Mutual) Global (FM).
  5.    Underwriters Laboratories, Inc. (UL).

**1.02      SUBMITTALS**

- A.    Action Submittals:
1.    Shop Drawings of each item specified showing materials, details, flashing, anchorage, and relation to adjacent structure.
  2.    Catalog cuts of each item specified item.
- B.    Informational Submittals: Manufacturer's Certificate of Compliance per Section 01 61 00, Common Product Requirements, (or alternately, test results or calculations) that assure item's and its anchorage's design criteria meets requirements of Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements.

**1.03      SEQUENCING AND SCHEDULING**

- A.    Coordination: Schedule and coordinate work of this section with work of Section 07 52 16, Thermoplastic Membrane Roofing and Section 07 62 00, Sheet Metal Flashing and Trim.

## **PART 2      PRODUCTS**

### **2.01      ROOF CURBS**

- A. Prefabricated aluminum: Minimum 12-inch-high curb with treated wood nailer, liner panel, and factory installed insulation as required for conditions shown on Drawings.
- B. Metal Gauge and Reinforcement: To suit imposed loads of equipment to be supported.
- C. Fabricate curbs to fit roof slope.
- D. Manufacturers and Products:
  - 1. Pate Co.; PC-2.
  - 2. ThyCurb; Model TC-3.
  - 3. RPS Corporation; RC-2A.

### **2.02      TPO PIPE BOOT**

- A. Pre-molded cone shaped boot.
- B. Must be compatible with roof system.
- C. Color: white.
- D. Manufacturers and Products: Johns Manville TPO Pipe Boot.

### **2.03      ROOF WALKWAY**

- A. Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads sourced from membrane roofing system manufacturer.
- B. Manufacturers and Products: Johns Manville; TPO Walkpad.

### **2.04      ROOF HATCHES**

- A. Material: Aluminum, 11-gauge with factory-insulated curb and cover.
- B. Manufacturers and Products:
  - 1. See Drawings:
    - a. Bilco; S-50.
    - b. Babcock-Davis; RHA Series.
    - c. JL Industries; RHA-1.

2.05 ANCILLARY MATERIALS

- A. Isolation Paint: ASTM D1187, asphalt.
- B. Coat aluminum surfaces in contact with concrete or dissimilar metals as specified in Section 09 90 00, Painting and Coating.
- C. Isolation Tape: Butyl or polyisobutylene, internally reinforced, or 20-mil-thick minimum polyester.
- D. Fasteners: Stainless steel of type required.

**PART 3 EXECUTION**

3.01 PREPARATION

- A. Examine surfaces and structures to receive the Work of this section.
- B. Take measurements at Site and fabricate work to suit. No changes shall be made in supporting structure to accommodate this Work.

3.02 INSTALLATION

- A. General:
  - 1. Install roof specialties and accessories as detailed in approved shop drawings and in conformance with manufacturer's instructions, recommendations, and standards.
  - 2. Use appropriate vent pipe flashing where pipes penetrate roofing.
  - 3. Use appropriate flashing where ductwork connects to existing roof curbs.
  - 4. Roof Hatches: Install to operate freely and not rattle when closed or open.
  - 5. Factory Finished Units: Place color variations in pieces so no extremes are next to each other.
  - 6. Make Work weathertight and free of expansion and contraction noise.
  - 7. Maintain separation between aluminum surfaces and concrete or dissimilar metals with isolation paint.

**END OF SECTION**



**SECTION 07 84 00  
FIRESTOPPING**

**PART 1 GENERAL**

**1.01 REFERENCES**

A. The following is a list of standards that may be referenced in this section:

1. ASTM International (ASTM): E814, Test Method for Fire Tests of Through-Penetration Firestops.
2. Underwriters Laboratory, Inc. (UL):
  - a. 1479, Fire Tests of Through-Penetration Firestops.
  - b. 2079, Tests for Fire Resistance of Building Joint Systems.

**1.02 SYSTEM DESCRIPTION**

A. Provide systems of material or combination of materials used to fill openings around penetrating items to prevent the spread of fire and retain integrity of fire rated construction by maintaining an effective barrier against spread of flame, smoke, water, and hot gases through penetrations in fire rated wall and floor assemblies.

B. Provide Fire Safing:

1. At slot gaps between edge of floor slabs and exterior walls.
2. Gaps between top of walls and structure above.
3. Expansion joints in walls, floors, and ceilings.

C. Performance Requirements: Provide firestop systems with materials that have been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage, or failure.

D. Regulatory Requirements:

1. Firestop Systems: Meet requirements of ASTM E814, UL 1479, or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
2. Proposed Firestop Materials and Methods: Conform to applicable governing codes having local jurisdiction.
3. Meet F and T ratings of ASTM E814 for a period equal to construction penetrated.
4. Underwriters Laboratories classified as fill, void, or cavity materials under UL 1479.

### 1.03 SUBMITTALS

#### A. Action Submittals:

1. Shop Drawings: Show layout, profiles, and product components; include UL Systems Number on Shop Drawings and diagram of UL approved assembly.
2. Product Data: Include manufacturer's SPEC-DATA® product sheet for products selected for use.

#### B. Informational Submittals:

1. Manufacturer's installation instructions.
2. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
3. Certificates: Certificate indicating installer qualifications.
4. Special Guarantee documents specified below.

### 1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced in performing Work of this section and specialized in the installation of work similar to that required for this Project.
- B. Preinstallation Meetings: Conduct preinstallation meeting to identify where seals are required and verify Project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at Project Site.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification and UL listing mark intact.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.
- D. Follow recommended procedures, precautions, or remedies described in Material Safety Data Sheets as applicable.



1.06 SEQUENCING AND SCHEDULING

- A. Firestopping requirements may be created by mechanical and electrical portions of the Work:
  - 1. Identify locations requiring firestopping.
  - 2. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

1.07 SPECIAL GUARANTEE

- A. Provide manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at the option of the Owner, removal and replacement of Work specified in this section found defective during a period of 2 years after the date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in the General Conditions.

**PART 2 PRODUCTS**

2.01 GENERAL

- A. Furnish firestop system products from a single manufacturer.

2.02 MANUFACTURERS

- A. 3M Corp.; Firestopping Products.
- B. Hilti Construction Chemicals; High Performance Firestop Systems.
- C. International Protective Coatings Corp. (IPC); Flamesafe Firestop Products.
- D. Isolatek International (Cafco); TPS.
- E. Specified Technologies; Inc. (STI).
- F. United States Gypsum Co. (USG); Firestop Systems and Thermafiber Safing Insulation.

2.03 MIXES

- A. For those products requiring mixing prior to application, follow firestopping manufacturer's directions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

## **PART 3      EXECUTION**

### **3.01      EXAMINATION**

- A. With manufacturer's representative, examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

### **3.02      PREPARATION**

- A. Surface Cleaning: Clean openings and joints immediately prior to installing firestopping in accordance with firestop manufacturer recommendations and the following requirements:
  - 1. Remove foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
  - 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping seal with substrates.

### **3.03      INSTALLATION**

- A. Manufacturer's Instructions: Follow manufacturer's instructions for installation of through-penetration systems selected for use.
  - 1. Seal holes or voids made by penetrations for pipes, conduits and ducts through fire-rated floors, walls, and roofs and to ensure air and water resistant seals.
  - 2. Receive Engineer's approval prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.

- B. Fire Safing: Install, following manufacturer's instructions, to completely fill gaps between tops of fire-rated walls and floor or roof deck above, between edge of floors and walls, and other locations indicated on Drawings.
- C. Meet Underwriters Laboratories and Factory Mutual requirements.

3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of Work accessible until inspection by applicable code authorities.
- C. Perform patching and repairing of firestopping caused by cutting or penetrating existing firestop systems.

3.05 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for installation assistance, inspection and certification of proper installation, and training of installer's personnel in proper installation procedures.

3.06 PROTECTION

- A. Protect installed product from contact with contaminating substances and from damage during construction.

**END OF SECTION**



**SECTION 07 92 00  
JOINT SEALANTS**

**PART 1 GENERAL**

**1.01 REFERENCES**

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):
  - a. C661, Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer.
  - b. C834, Standard Specification for Latex Sealants.
  - c. C920, Standard Specification for Elastomeric Joint Sealants.
  - d. C1193, Standard Guide for Use of Joint Sealants.

**1.02 SUBMITTALS**

A. Action Submittals:

1. Shop Drawings: Surface preparation instructions. Indicate where each product is proposed to be used.
2. Samples: Material proposed for use showing color range available.

B. Informational Submittals:

1. Installation instructions.
2. Documentation showing applicator qualifications.
3. Manufacturer's Certificate of Compliance, in accordance with Section 01 61 00, Common Product Requirements.
4. Special guarantee.

**1.03 QUALITY ASSURANCE**

A. Applicator Qualifications: Minimum of 5 years' experience installing sealants in projects of similar scope.

**1.04 ENVIRONMENTAL REQUIREMENTS**

A. Ambient Temperature: Between 40 degrees F and 80 degrees F (4 degrees C and 27 degrees C) when sealant is applied. Consult manufacturer when sealant cannot be applied within these temperature ranges.

1.05 SPECIAL GUARANTEE

- A. Product: Furnish manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction or, at the option of the Owner, removal and replacement of Work specified in this section found defective during a period of 5 years after the date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in the General Conditions.
- B. Conditions: No adhesive or cohesive failure of sealant.
- C. Sealed Joints: Watertight and weathertight with normal usage.

**PART 2 PRODUCTS**

2.01 SEALANT MATERIALS

- A. Characteristics:
  - 1. Uniform, homogeneous.
  - 2. Free from lumps, skins, and coarse particles when mixed.
  - 3. Nonstaining, nonbleeding.
  - 4. Hardness of 15 minimum and 50 maximum, measured by ASTM C661 method.
  - 5. Immersible may be substituted for nonimmersible.
- B. Color: Unless specifically noted, match color of the principal wall material adjoining area of application.
- C. Type 1—Silicone, Nonsag, Nonimmersible:
  - 1. Silicone base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 25.
  - 2. Capable of withstanding movement up to 50 percent of joint width.
  - 3. Manufacturers and Products:
    - a. Dow Corning Corp.; No. 790.
    - b. General Electric; Silpruf.
    - c. BASF; Sonneborn, Omniseal-50.
- D. Type 2—Multipart Polyurethane, Self-leveling, Immersible:
  - 1. Polyurethane base, multicomponent, chemical curing; ASTM C920, Type M, Grade P, Class 25.
  - 2. Capable of being continuously immersed in water.

3. Manufacturers and Products:
  - a. BASF; Sonneborn, SL-2.
  - b. Pecora Corp.; Urexspan NR-200.
  - c. Tremco; THC-900/901.
  - d. Sika Chemical Corp.; Sikaflex 2c SL.
- E. Type 3—Multipart Polyurethane, Nonsag, Immersible:
  1. Polyurethane base, multicomponent, chemical curing; ASTM C920, Type M, Grade NS, Class 25.
  2. Capable of being continuously immersed in water.
  3. Manufacturers and Products:
    - a. Pecora; DynaTrol II.
    - b. Tremco; Dymeric 240.
    - c. BASF; Sonneborn NP-2.
    - d. Sika Chemical Corp.; Sikaflex 2c NS.
- F. Type 5—One-part Polyurethane, Immersible:
  1. Polyurethane base, single-component, moisture curing; ASTM C920, Type S, Grade NS or P, Class 25.
  2. Capable of being continuously immersed in water.
  3. Manufacturers and Products for Nonsag:
    - a. Sika Chemical Corp.; Sikaflex-1a.
    - b. Tremco; Vulkem 116.
  4. Manufacturers and Products for Self-leveling:
    - a. BASF; Sonneborn, SL-1.
    - b. Tremco; Vulkem 45.
    - c. Sika Chemical Corp.; Sikaflex 1c SL.
- G. Type 8—One-Part Polysulfide, Nonsag, Nonimmersible:
  1. Polysulfide base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 12 1/2.
  2. Capable of withstanding movement up to 20 percent of joint width.
  3. Manufacturer and Product: W. R. Meadows; Deck-O-Seal, one-part.
- H. Type 10—Sanitary Sealant:
  1. Silicone sealant similar to Type 1, above, formulated to resist mold growth and repeated exposure to high humidity while retaining adhesion, flexibility, and color.
  2. Manufacturers and Products:
    - a. Dow Corning; 786.
    - b. General Electric; Sanitary Sealant SCS1700.

I. Type 11—Fire Penetration Seal:

1. Manufacturers and Products:
  - a. 3M Corp.; Fire Barrier Caulk CP25 and Putty 303.
  - b. General Electric; Pensil Sealant or Foam.
  - c. Unifrax Corporation; Fyre Putty.
  - d. Hilti USA; CP 604.

J. Type 12—One-Part Polycarbonate, Immersible:

1. Polycarbonate base, single-component, moisture curing; ASTM C920, Type S, Grade NS, Class 25.
2. Capable of being continuously immersed in water.
3. Manufacturer and Product: Pro-Seal Products, Inc.; Pro-Seal 34.

K. Type 13—Tape Sealant:

1. Compressible polyurethane foam impregnated with polybutylene or polymer-modified asphalt.
2. Color: Black.
3. Size: 3/4 inch wide by length required by expanded thickness recommended by manufacturer for particular application.
4. Manufacturers and Products:
  - a. Emseal Joint Systems, Ltd.; AST—High Acrylic.
  - b. Dayton Superior; Polytite Standard.
  - c. PARR Technologies; PARR Sealant EP-7212-T.

2.02 BACKUP MATERIAL

- A. Nongassing, extruded, closed-cell round polyurethane foam or polyethylene foam rod, compatible with sealant used, and as recommended by sealant manufacturer.
- B. Size: As shown or as recommended by sealant material manufacturer. Provide for joints greater than 3/16-inch wide.
- C. Manufacturers and Products:
  1. Sonneborn; Sonolastic Closed-cell Backing Rod.
  2. Tremco; Closed-cell Backing Rod.
  3. Pecora Corporation; Green Rod.



## 2.03 ANCILLARY MATERIALS

- A. Bond Breaker: Pressure sensitive tape as recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Noncorrosive and nonstaining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Primer: Nonstaining type recommended by sealant manufacturer to suit application.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Use of more than one material for the same joint is not allowed unless approved by sealant manufacturer.
- B. Install joint sealants in accordance with ASTM C1193.
- C. Horizontal and Sloping Joints up to 1 Percent Maximum Slope: Use self-leveling (Grade P) joint sealant.
- D. Steeper Sloped Joints, Vertical Joints, and Overhead Joints: Use nonsag (Grade NS) joint sealant.
- E. Use joint sealant as required for the applicable application and as follows:

Joint Size	Sealant Type
Less than 1"	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, or 12
Less than 2"	1, 2, 3, 4, or 7
Over 2"	Follow manufacturer's recommendation

### 3.02 PREPARATION

- A. Verify that joint dimensions, and physical and environmental conditions, are acceptable to receive sealant.
- B. Surfaces to be sealed shall be clean, dry, sound, and free of dust, loose mortar, oil, and other foreign materials.
  - 1. Mask adjacent surfaces where necessary to maintain neat edge.
  - 2. Starting of work will be construed as acceptance of subsurfaces.
  - 3. Apply primer to dry surfaces as recommended by sealant manufacturer.

- C. Verify joint shaping materials and release tapes are compatible with sealant.
- D. Examine joint dimensions and size materials to achieve required width/depth ratios.
- E. Follow manufacturer's instructions for mixing multi-component products.

### 3.03 INSTALLATION

- A. Use joint filler to achieve required joint depths, to allow sealants to perform intended function.
  - 1. Install backup material as recommended by sealant manufacturer.
  - 2. Where possible, provide full length sections without splices; minimize number of splices.
  - 3. Tape sealant may be used as joint filler if approved by sealant manufacturer.
- B. Use bond breaker where recommended by sealant manufacturer.
- C. Seal joints around window, door and louver frames, expansion joints, control joints, and elsewhere as indicated.
- D. Joint Sealant Materials: Follow manufacturer's recommendation and instructions, filling joint completely from back to top, without voids.
- E. Joints: Tool slightly concave after sealant is installed.
  - 1. When tooling white or light color sealant, use a water wet tool.
  - 2. Finish joints free of air pockets, foreign embedded matter, ridges, and sags.
- F. Tape Sealant: Compress to 50 percent of expanded thickness and install in accordance with manufacturer's instructions.

### 3.04 CLEANING

- A. Clean surfaces next to the sealed joints of smears or other soiling resultant of sealing application.
- B. Replace damaged surfaces resulting from joint sealing or cleaning activities.

## 3.05 JOINT SEALANT SCHEDULE

- A. This schedule lists the sealant types acceptable for each joint location. Use as few different sealant types as possible to meet the requirements of Project.

Joint Locations	Sealant Type(s)
<b>Expansion/Contraction and Control Joints At:</b>	
Concrete Floor Slabs (except for water-holding Structures)	2, 5
Slabs Subject to Vehicle and Pedestrian Traffic	2, 5
Ceramic Tile Floors	1, 2, 5, 10
Ceramic Tile Walls	1, 3, 5, 10
<b>Material Joints At:</b>	
Metal Door, Window, and Louver Frames (Exterior)	1, 5, 6, 8, 12
Metal Door, Window, and Louver Frames (Interior)	1, 5, 8,
Wall Penetrations (Exterior)	1, 5, 8, 12
Wall Penetrations (Interior)	1, 5, 8
Floor Penetrations	5
Ceiling Penetrations	1, 3, 5,
Roof Penetrations	5
Sheet Metal Flashings	5, 13
Precast Concrete Wall Panels	1, 3, 5, 12, 13
<b>Other Joints:</b>	
Threshold Sealant Bed	5
Between Counter Tops and Backsplashes	10
Around Plumbing Fixtures	10
Openings Around Pipes, Conduits, and Ducts Through Fire-Rated Construction	11
Concrete Form Snap-Tie Holes	1, 5

**END OF SECTION**



**SECTION 08 14 00  
WOOD DOORS AND FRAMES**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards that may be referenced in this section:
1.    American National Standards Institute (ANSI):
    - a.    A250.8, Recommended Specifications for Standard Steel Doors and Frames.
    - b.    A250.11, Recommended Erection Instructions for Steel Frames.
    - c.    A117.1 Specifications for making buildings and facilities usable by physically handicapped people.
  2.    ASTM International (ASTM):
    - a.    A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - b.    E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
  3.    Window and Door Manufacturers Association (WDMA):
    - a.    Industry Standard I.S.1-A, Architectural Wood Flush Doors.
    - b.    Industry Standard I.S.6-A, Architectural Wood Stile and Rail Doors.
  4.    Underwriters Laboratories Inc. (UL): Building Materials Directory.
  5.    Warnock Hersey Certification Listings.
  6.    DHI-Door and Hardware Institute.

**1.02      SUBMITTALS**

- A.    Action Submittals:
1.    Shop Drawings: Prepare specifically for this Project, indicating location and size of each door, veneer species, type and characteristics, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, factory finishing, if any, glass and glazing, and other pertinent data.
    - a.    For factory-premachined doors, also indicate dimensions and locations of cutouts for finish hardware and cutouts for light and louver openings.
    - b.    Use same reference numbers for door openings and details as Contract Drawings.

2. Samples-Manufacturers samples of the following door components:
  - a. Door veneer samples.
  - b. Aluminum specialty frame components.

B. Informational Submittals:

1. Manufacturer's Certification of Compliance in accordance with Section 01 43 33, Manufacturers' Field Services.
2. Manufacturer's instructions for care and handling.
3. Maintenance instructions for sealing door edges.
4. Certificate of Compliance per Section 01 43 33, Manufacturer's Field Services (or alternately, test results or calculations), to document that item and anchorage design criteria meets requirements of Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver doors to jobsite after moisture-producing construction operations are complete and building has reached average prevailing relative humidity of locality.
2. Deliver doors clearly marked with manufacturer's name, brand name, size, thickness, and identifying symbol.
3. Seal edges of doors before delivery to jobsite.

B. Storage:

1. Store doors in area where there will be no variation greater than plus or minus 5 percent in heat and humidity.
2. Stack flat on wood blocking, laid 12 inches from ends and across center.
3. Under bottom door and over top of stack provide plywood or corrugated cardboard to protect door surface.

C. Handling:

1. Handle with clean gloves.
2. Do not drag doors across one another or across other surfaces.

1.04 SPECIAL GUARANTEE

- A. Provide as special guarantee, manufacturer's extended guarantee or warranty, with Owner named in writing as beneficiary. Special guarantee shall provide for correction, or at option of Owner, removal and replacement of flush doors specified in this Specification section found defective during a period of 5 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in General Conditions.
- B. Conditions: Free of warp more than 1/4 inch in plane of door and no delamination of veneers.

**PART 2 PRODUCTS**

2.01 FLUSH WOOD DOORS

- A. Solid Core Wood Doors:
  - 1. Premium grade, five-ply.
  - 2. Staved wood core or particleboard core.
  - 3. Type I glue.
  - 4. Thickness: 1-3/4 inches.
  - 5. Faces: Veneers and matching vertical edges of plain sliced red oak.
  - 6. Doors to be factory finished stain with satin gloss Enviroclad UV finish or equal.
  - 7. Manufacturer: Marshfield Door System, Inc or approved equal.
- B. Door Louvers: As specified and scheduled in Section 08 90 00, Louvers and Vents.
- C. Glass Stops:
  - 1. Nonfire-Rated Doors: Hardwood to match door face.
  - 2. Fire-Rated Doors: Metal with veneer cover to match door face.
- D. Transom Panels:
  - 1. Match adjacent doors in appearance and construction.
  - 2. Continuous match face grain across joint.
  - 3. Rabbet joint between door and panel for 1/2-inch minimum overlap.

## 2.02 FABRICATION OF FLUSH WOOD DOORS

- A. Manufacture in accordance with WDMA Industry Standard I.S.1-A.
- B. Wood Louvers: Factory install into prepared openings.
- C. Glass Stops: Factory install, loose tacked for easy removal.
- D. Moldings: Factory install in configuration indicated.
- E. Prefitting and Premachining of Doors: At Contractor's option.
  - 1. Within tolerances specified herein.
  - 2. Coordinate with Finish Hardware Schedule and door frames.

## 2.03 STEEL DOOR FRAMES

- A. Wood doors are to be installed in painted steel frames.
- B. Frames are to be hot-dipped zinc coated steel that complies with ASTM A924, A60, 16 gauge.
- C. Zinc-coated steel conforming to ASTM A 653/A 653M, CS, Type B.
- D. All frames are to have back welded face seams only at the frame corner or intersections. Grind and dress smooth the weld area. Apply a factory baked-on zinc rich primer over the grind area and finish with factory applied pre-finished paint coating.

## 2.04 SOUND-RESISTANT DOORS

- A. Solid core doors with minimum Sound Transmission Class (STC) of 40 decibels or better when tested in accordance with ASTM E90.

# **PART 3 EXECUTION**

## 3.01 INSPECTION

- A. Verify door frames are of type required for door and are installed as required for proper installation of doors.
- B. Do not install doors in frames that would hinder operation of doors.



3.02 INSTALLATION

- A. Fit doors for width by planning; for height by sawing.
- B. Tolerances:
  - 1. From Bottom to Floor Covering: 1/2 inch.
  - 2. From Bottom to Top of Threshold: 1/4 inch.
  - 3. Maximum From Top: 1/8 inch.
  - 4. Bevel Lock and Hinge Edges: 1/8 inch in 2 inches.
  - 5. Clearance of Meeting Stiles of Pairs of Doors: 1/8 inch.
- C. Seal Job Site cut surfaces with two coats of door manufacturer's standard sealer before final hanging of doors.

3.03 ADJUSTING

- A. Adjust sliding doors for proper operation in accordance with manufacturer's instructions.
- B. Adjust sliding doors to operate smoothly without binding.
- C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

3.04 ADJUST AND CLEAN

- A. Replace or rehang doors that are hinge-bound and do not swing or operate freely.
- B. Replace prefinished doors damaged during installation.
- C. Refinish or replace job-finished doors damaged during installation.

3.05 SCHEDULE

- A. For tabulation of door and frame characteristics, such as size, type, detail, and finish hardware requirements, see Section 08 71 00, Door Hardware Schedule on Drawings.

**END OF SECTION**



**SECTION 08 16 13  
FIBERGLASS DOORS**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards that may be referenced in this section:
1.    ASTM International (ASTM):
    - a.    D635, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
    - b.    E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  2.    The Aluminum Association, Incorporated (AA): Designation System for Aluminum Finishes.
  3.    American Architectural Manufacturers Association (AAMA): 605.2, Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
  4.    ASTM International (ASTM): B209/B209M, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

**1.02      PERFORMANCE REQUIREMENTS**

- A.    Structural Performance: Provide exterior door assemblies capable of withstanding the design loads for wind pressure shown on the Project Structural Drawings.

**1.03      SUBMITTALS**

- A.    Action Submittals:
1.    Shop Drawings:
    - a.    Manufacturer's literature, and Drawings prepared for this Project showing types, sizes, fire ratings, complete details of door and frame construction, including resin used, glass/resin ration, cutouts and anchorage for units.
    - b.    Manufacturer's literature and Drawings prepared for this Project showing door hardware that will be installed on fiberglass door assemblies.
  2.    Provide complete door schedule using the nomenclature for door names and numbers that are used for the Project Drawings.
  3.    Include maximum tested wind pressure resistance before failure for each exterior door assembly.
  4.    Samples: Two Samples to verify custom color match, if any.

B. Informational Submittals:

1. Manufacturer's installation instructions.
2. Manufacturer's instructions for handling and care of products.
3. Executed guarantee.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver doors to jobsite after moisture-producing construction operations are complete and building has reached average prevailing relative humidity of locality.
2. Deliver doors and frames in unopened packages, clearly marked with manufacturer's name, brand name, size, thickness, and identifying symbol or mark related to door numbers used in Contract Documents.

B. Storage and Handling:

1. In strict compliance with manufacturer's instructions and recommendations.
2. Minimize onsite storage time.
3. Handle with clean gloves.
4. Do not drag doors across one another or across other surfaces.
5. Store in dry area and protect from damage.

1.05 SPECIAL GUARANTEE

- A. Provide manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at option of Owner, removal and replacement of Work specified in this Specification section found defective during a period of 10 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in the General Conditions.
- B. Defects include warp, separation or delamination from core, expansion of core, and failures due to corrosion.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

- A. Chem-Pruf Door Company.
- B. Fib-R-Dor, Division of Advance Fiberglass, Inc.
- C. Tiger Door, Division of Composite Structures, Inc.

## 2.02 DOORS

### A. General:

1. Flush construction, minimum 1-3/4 inches thick, with no seams, cracks, or joints.
2. Full length integral edge reinforcement.
3. Face shall not deviate more than 1/4 inch from a true plane at any point.
4. Reinforced to receive hardware specified.
5. Doors shall be prehung at factory.
6. Resins:
  - a. Fire retardant formulation plus antimony trioxide to achieve an ASTM E84 flame spread of 25 or less and be self-extinguishing in accordance with ASTM D635.
  - b. Contain Ultraviolet light inhibitor additives.
7. Prepare doors and frames for hardware at factory and only after receipt of approved hardware templates.
8. Make cutouts for openings at factory and furnish with FRP frames and stops that prevent moisture from entering or passing through door.
9. Glazing: As specified in Section 08 80 00, Glazing.
10. Glazing may be done in factory or field.

### B. Doors:

1. Molded in one continuous piece.
2. Core of end-grain balsa wood or closed cell, non-absorptive, 2 pounds per square foot density, isocyanurate or urethane rigid foam.
3. Finish: Manufacturer's standard in colors selected.
4. Furnish astragals at joints between pairs and with transom panels.

### C. Transom Panels: Match door construction and finish.

## 2.03 FRAMES

- ### A. Manufacturer's standard one-piece-pultruded, three-piece built-up, or one-piece molded FRP with double rabbeted profile, reinforced for specified hardware, assembled with stainless steel fasteners, and furnished with wall anchors for installation after wall opening is complete.
1. Furnished by door manufacturer with finish to match doors and prepared for hardware specified.

**B. Aluminum Frames:**

1. Extruded from 6063-T5 aluminum alloy meeting ASTM B209.
2. Minimum Wall Thickness: 0.125 inch.
3. Mechanically fastened corners.
4. Reinforcements: 6061-T6 aluminum of 1/4-inch minimum thickness.
5. Size and Profile: 5 inches by 1-3/4 inches, with open or closed back and applied stop with integral weatherstripping.
6. Concealed fasteners or welding are preferred to through-the-face fasteners.
7. Furnished by door manufacturer and prepared for hardware specified. Frame finish as indicated in Color List Schedule shown on the Drawings.

**PART 3 EXECUTION**

**3.01 INSPECTION**

- A. Verify doors and frames comply with approved Shop Drawings and meet indicated requirements for type, size, hardware, location, and swing.
- B. Examine openings for conditions that would prevent proper installation.
- C. Do not proceed with installation until defects are corrected.
- D. Do not install doors in frames that would hinder operation of doors.

**3.02 INSTALLATION**

- A. Install, following manufacturer's written instructions, using only noncorrosive materials and methods.
- B. Tolerances:
  1. From Door Bottom to Floor Covering: 1/2 inch.
  2. From Bottom to Top of Threshold: 1/4 inch.
  3. Maximum From Top: 1/8 inch.
  4. Bevel Lock and Hinge Edges: 1/8 inch in 2 inches.
  5. Clearance of Meeting Stiles of Pairs of Doors: 1/8 inch.
- C. Install frames square, plumb, rigid, and in true alignment. Brace securely during construction to retain proper position and clearances. Anchor firmly in place.

- D. Do not cut or otherwise alter integrity of door to allow door to fit frame.
- E. Frames Set in Concrete or Masonry: Secure each jamb with four stainless steel expansion anchors following manufacturer's instructions.

3.03 ADJUST AND CLEAN

- A. Replace or rehang doors that are hinge-bound and do not swing, latch or operate smoothly and freely.
- B. Remove and install new prefinished doors in place of those damaged during installation.
- C. Refinish, or replace with new, job-finished doors damaged during installation.
- D. Modify doors and frames only at manufacturer's factory.

3.04 SCHEDULE

- A. For tabulation of door and frame characteristics, such as size, type, detail, and finish hardware requirements see Door and Hardware Schedule on Drawings.

**END OF SECTION**





**SECTION 08 30 00  
SPECIALTY DOORS**

**PART 1 GENERAL**

**1.01 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
1. The Aluminum Association, Incorporated (AA): Designation System for Aluminum Finishes.
  2. American Iron and Steel Institute (AISI).
  3. ASTM International (ASTM):
    - a. A36/A36M, Standard Specification for Carbon Structural Steel.
    - b. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
    - c. A480/A480M, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
    - d. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  4. UL: Building Materials Directory.

**1.02 SUBMITTALS**

- A. Action Submittals:
1. Shop Drawings:
    - a. Manufacturer's cut sheets and specifications for each type of access doors.
    - b. Identify each door with same reference as used on Drawings.
    - c. Anchorage and bracing drawings and/or catalog information, as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements.
  2. Samples: Manufacturer's current color sample(s) for factory finished coatings.
- B. Informational Submittals:
1. Anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements. Submit with Action Submittal for the same item.
  2. Suspension installation details for access doors to be installed in suspended gypsum board ceilings.

1.03 QUALITY ASSURANCE

- A. Qualifications: Experienced, factory authorized installer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors with separators and wrapping to protect units from damage during and after installation.
- B. Store doors in protected dry area following manufacturer's requirements.
- C. Handle doors according to manufacturer's instructions.
- D. Protect exposed finish surfaces of prefinished items with wrapping.

**PART 2 PRODUCTS**

2.01 ACCESS DOORS-WALL AND CEILING

- A. Manufacturers:
  - 1. Bar-Co, Enterprise, AL.
  - 2. J.L. Industries, Bloomington, MN.
  - 3. Milcor Inc., Lima, OH.
  - 4. Karp Associates Inc., NY.
- B. Ceiling Manufactured Unit: Flush panel access doors and frames with anchors to suit ceiling conditions. 24 inches by 24 inches 18-gauge frame galvanized steel frame. Door lined with 3/8-inch mineral fiberboard and gasketing of flame retardant polyurethane or approved equal. Head key operated.
- C. Wall Access Doors: Size As shown on Drawings. (Minimum 18 inches by 18 inches).
- D. Door assemblies will be recessed on both wall and ceiling specialty doors to receive the finished wall all ceiling material.
- E. Frames:
  - 1. One-piece 14-gauge minimum steel with 3/4-inch minimum exposed flange to cover edge of wall finish.
  - 2. Dry Wall Type: 16-gauge steel with outer flange in a dry wall bead configuration for application of joint compound.

- F. Hinges: Spring-loaded concealed hinges permitting a minimum of 160-degree door travel and door removal.
- G. Finish: AISI SS 201, No. 4.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install special doors in accordance with the manufacturer's recommendations and printed instructions.
- B. Provide pushbutton operators outside doors.
- C. Adjust doors for smooth, satisfactory operation.

#### **3.02 ACCESS DOOR INSTALLATION**

- A. Install access panels at cleanouts, valves, or other equipment requiring adjustment or servicing concealed within wall, furred spaces, or ceilings.
- B. Fire access doors to plenum above suspended gypsum board ceilings. Install per manufacturer's recommendations.

#### **3.03 PRIME COAT TOUCHUP**

- A. Damaged Prime Coat:
  - 1. Remove rust.
  - 2. Sand smooth.
  - 3. Use same primer as shop.
  - 4. Touch up so it is not obvious.

#### **3.04 PROTECTION**

- A. Protect installed doors against damage from other construction Work.

#### **3.05 SCHEDULE**

- A. For tabulation of door and frame characteristics, such as size, type, detail, and finish hardware requirements, see Door and Hardware Schedule on Drawings.

### **END OF SECTION**



**SECTION 08 33 23  
OVERHEAD COILING DOORS**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    ASTM International (ASTM):
    - a.    A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - b.    A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
    - c.    B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
    - d.    B221M, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
    - e.    E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  2.    Intertek Testing Services (Warnock Hersey Listed) (WH): Certification Listings.
  3.    National Association of Metal Manufacturers (NAAMM).
  4.    National Fire Protection Association (NFPA):
    - a.    80, Standard for Fire Doors and Other Opening Protectives.
    - b.    252, Standard Methods of Fire Tests of Door Assemblies.
  5.    UL:
    - a.    Building Materials Directory.
    - b.    10B, Standard Safety for Fire Tests of Door Assemblies.
    - c.    325, Standard Safety for Door, Drapery, Gate, Louver, and Window Operators and Systems.

**1.02      SUBMITTALS**

- A.    Action Submittals:
1.    Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
  2.    Product Data: General construction, component connections and details.

**B. Informational Submittals:**

1. Certificate of Compliance per Section 01 43 33, Manufacturer's Field Services (or alternately, test results or calculations) that assure item's and its anchorage's design criteria meets requirements of Section 01 88 15, Anchorage and Bracing for loads provided in Section 01 61 00, Common Product Requirements.
2. Third party testing documentation or manufacturer's literature qualifying door model as meeting required developed wind pressures and impact testing for large missile. Miami-Dade Notice of Approval (NOA) documentation is acceptable as third party evidence of certification.
3. Manufacturer's Instructions: Indicate installation sequence and procedures, and adjustment and alignment procedures.
4. Operation and Maintenance Data as specified in Section 01 78 23, Operation and Maintenance Data, include lubrication requirements and frequency, and periodic adjustments required.
5. Anchorage and Bracing:
  - a. Drawings and product data as required by Section 01 88 15, Anchorage and Bracing.
  - b. Calculations as required by Section 01 88 15, Anchorage and Bracing.
  - c. Installer's factory authorization.

**1.03 QUALITY ASSURANCE**

**A. Qualifications:**

1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum 3 years documented experience.
2. Installer: Company specializing in performing work of this section with minimum 5 years documented experience approved by manufacturer.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

**A. Materials, equipment, and accessories specified in this section shall be products of:**

1. Cookson Co.; Model ESD30.
2. Cornell Iron Works, Inc.; Model ESD20.
3. Overhead Door Co.; Model 591.

2.02 GENERAL

- A. Assembly shall meet design wind pressures as shown on the structural drawings.
- B. Assembly shall meet large missile testing as defined by International Building Code.
- C. Operation: Design door assembly to operate for not less than 20,000 cycles per day.

2.03 COMPONENTS

- A. Curtain: Conform to the following:
  - 1. Aluminum Slats: Interlocking, minimum 0.040 inch (1 mm) thick of ASTM B221 aluminum alloy Type 6063.
  - 2. Type: Sandwich slat construction with manufacturer's standard insulated core with maximum U-value of 0.16 and backing to match face slat, thermally separated from face slat.
  - 3. Nominal Slat Size: 3 inches.
  - 4. Slat Ends: Each slat fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
  - 5. Curtain Bottom: Fitted with aluminum angles, channels, or hollow extrusion to provide reinforcement and positive contact with floor.
- B. Guides: Minimum 0.1875 inch (5 mm) thick; rolled aluminum angles.
- C. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension.
- D. Hood Enclosure and Fascia: Square shape, minimum 0.040-inch thick aluminum; internally reinforced to maintain rigidity and shape.
- E. Hardware: As specified in Section 08 71 00, Door Hardware.
- F. Manual Operation: Manual hand chain lift unit with overhead counter balance device, requiring 25 pound (10 kg) nominal force to operate.

2.04 FINISHES

- A. Curtain Slats: Aluminum, Factory Powder Coated. Color as indicated in the Color Schedule shown on the Drawings.
- B. Guides and Hood Enclosure: Aluminum, Factory Powder Coated. Color as indicated in the Color Schedule shown on the Drawings.

2.05 SOURCE QUALITY CONTROL

- A. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.
  - 1. Oversize Door Certification: Provide UL Certificate of Inspection or comparable certification acceptable to authorities having jurisdiction, in lieu of label for oversize door assemblies exceeding 120 square feet (11.15 square m) or 24 feet (7.3 m) in any dimension.
- B. Apply label from agency approved by authority having jurisdiction to identify each foam plastic insulation board.

**PART 3 EXECUTION**

3.01 EXAMINATION

- A. Verify opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

- A. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- B. Securely and rigidly brace components suspended from structure.
- C. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- D. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 92 00, Joint Sealants.
- E. Install perimeter trim and closures.



3.03 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent Work.
- B. Maximum Variation from Plumb: 1/16 inch.
- C. Maximum Variation from Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet (3 mm per 3 m) straight edge.

3.04 ADJUSTING

- A. Adjust door, hardware and operating assemblies for smooth and noiseless operation.

3.05 CLEANING

- A. Leave door and components clean.
- B. Remove labels and visible markings.

**END OF SECTION**



**SECTION 08 41 13**  
**ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS**

**PART 1      GENERAL**

1.01      GENERAL

- A.    Aluminum and glass door and frame assemblies are located in the following buildings:
  - 1.    Dewatering and Control Building.

1.02      REFERENCES

- A.    The following is a list of standards which may be referenced in this section:
  - 1.    The Aluminum Association, Incorporated (AA): Designation System for Aluminum Finishes.
  - 2.    American Architectural Manufacturers Association (AAMA): 800, Voluntary Specification and Test Method for Sealants.
  - 3.    ASTM International (ASTM):
    - a.    C509, Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
    - b.    D1187, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
    - c.    E283, Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences Across the Specimen.
    - d.    E330, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
    - e.    E331, Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

1.03      SYSTEM DESCRIPTION

- A.    Design Requirements:
  - 1.    Provide a thermally isolated aluminum framing system that uses straight-in glazing without projecting stops. Position glass near exterior of frame.
  - 2.    System shall have interior flashing to provide continuous flashing to exterior through pressure relieved horizontal weep holes.
  - 3.    Face Clip Design:
    - a.    Engaged by pushing straight into the clip.
    - b.    Easily removed for deglazing.

- c. Reusable for reglazing.
- 4. Entrances and glass framing shall be compatible in appearance.
- 5. Specific door locations may require sidelites and/or transoms. See Drawings for Door Types and Schedules.
- B. Performance Requirements: Meet requirements of Article Performance Tests.
- C. Provide door assemblies capable of withstanding the design loads specified on Structural Drawings.
- D. The door and window assemblies shall be impact resistant assemblies designed to safely resist the positive and negative loads as required for the location and type of project designed according to the requirements of the International Building Code (IBC).

#### 1.04 SUBMITTALS

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Elevations and details of doors, framing, and anchorage to structure.
    - b. Manufacturer's brochures or catalogs, specifications, recommendations, and standard details illustrating and specifying products proposed for use on this Project.
    - c. Show field measurements.
    - d. Anchorage and bracing drawings and/or catalog information, as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements.
  - 2. Samples: At least 3-inch-long Samples of anodized extruded aluminum, showing probable range of variation in color.
  - 3. Product/Code Certification:
    - a. Provide written verification that submitted door assemblies and installation method meet or exceed Project Performance Requirements, in this section, by one, or more, of the following methods as allowed for by the (IBC):
      - 1) Miami Dade County (NOA) Notice of acceptance for complete window system assembly.
      - 2) Rational Comparative Analysis: Testing data, calculations and verification documents signed and sealed by a professional engineer registered in the State of Alabama.
      - 3) Local product approval by Authority Having Jurisdiction (AHJ).

**B. Informational Submittals:**

1. Anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements. Submit with Action Submittal for the same item.
2. Evidence of installer's qualifications.
3. Certified test reports showing compliance with specified performance tests.
4. Manufacturer's Certificate of Compliance: In accordance with Section 01 33 00, Submittal Procedures.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Entity specializing in the installation of aluminum glazing systems, with a minimum of 3 years' experience and approved by the system manufacturer.
- B. Preinstallation Meeting: Conduct to discuss and verify project requirements, substrate conditions, and manufacturer's installation instructions and warranty requirements.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store materials as recommended by manufacturer, in inside designated areas, free of dust and corrosive fumes, as close as possible to point of installation.
- C. Prevent contaminants from contacting aluminum.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Framing systems, entrance doors, and ventilators shall be the products of a single manufacturer.
- B. Materials and products specified in this section shall be products of:
  1. Kawneer Co.
  2. United States Aluminum Corp.
  3. Tublite, Inc.

## 2.02 BASIC MATERIALS

- A. Basic Aluminum Extrusions: 6063-T5 aluminum not less than 0.094-inch thick; door extrusions not less than 0.125-inch thick.
- B. Framing Members: 6 inches in depth with thermal break and face width of 2 to 2-1/2 inches as required to resist developed wind pressure.
- C. Swing Entrance Doors:
  - 1. Thickness: 1-3/4 inches.
  - 2. Stile and Rail Construction:
    - a. Medium 3-1/2-inch stiles and top rails, and 6-inch bottom rail.
    - b. Mechanically fastened and welded.
    - c. Hook-in type glazing stops.
    - d. Configuration indicated.
  - 3. Flush Construction:
    - a. Face sheets of plain unpatterned architectural quality 5005 alloy aluminum, 0.050-inch thick, interlocked with stiles and rails.
    - b. Aluminum stiles and rails, mechanically fastened and welded.
    - c. Core of froth-in-place urethane foam, free of chlorofluorocarbon (CFC) blowing agents.
    - d. Aluminum framed vision lights.
    - e. Configuration indicated.
- D. Glazing Gaskets: Framing manufacturer's standard elastomeric extrusion, conforming to ASTM C509.
- E. Glass and Glazing: As specified in Section 08 80 00, Glazing.
- F. Concealed Fastening Devices, Reinforcements, and Other Internal Components: Of aluminum alloy, stainless steel, or corrosion-resistant plated.
- G. Screws: Stainless steel, factory finished color to match aluminum finish.
- H. Hardware: As specified in Section 08 71 00, Door Hardware.
- I. Sealants:
  - 1. AAMA 800, to seal metal to metal, nonworking joints.
  - 2. Color to be compatible with adjacent materials.

J. Isolation Tape:

1. Manufacturers and Products:

- a. Tremco; 440.
- b. 3M; EC1202.
- c. Presstite; 579.6.

K. Isolation Paint: Provide as specified in Section 09 90 00, Painting and Coating.

2.03 FINISH

A. Exposed Framing Members: Free of scratches and other serious surface blemishes.

B. Treatment and Color:

1. Caustic etch and anodic oxide.
2. Color: As indicated on Drawings.

2.04 FABRICATION

A. Methods of Fabrication and Assembly: Manufacturer's discretion, unless otherwise specified.

B. Reinforcement for Surface Hardware: Manufacturer's standard.

C. Wind Load: Reinforce mullions as necessary to limit deflection to 1/175 of span in addition to dead loads.

D. Assembly: As far as practicable, do fitting and assembly work in shop.

**PART 3 EXECUTION**

3.01 PREPARATION

A. Substrate Conditions: Verify acceptability for product installation in accordance with manufacturer's instructions.

B. Field Measurements: Verify actual opening sizes prior to fabrication.

3.02 INSTALLATION

A. In accordance with manufacturer's installation instructions.

B. Set items straight, level, square, plumb, and at proper elevations and in alignment with other work.

- C. Securely anchor units to surrounding structure to resist wind loads and to withstand the normal loads imposed by the operation of the doors.
- D. Fasten framing members in place using screws and backing, anchor plugs, or straps.
  - 1. Accurately cut and fit framing and moldings to result in tightly closed flush, hairline weathertight joints.
  - 2. No visible unfinished aluminum.
  - 3. Provide concealed attachments and fasteners.
- E. Door Operation:
  - 1. Swing freely, and without rattle when closed.
  - 2. Swing Type Doors: Head and jamb clearance of 3/32 inch, plus or minus 1/32 inch.
- F. Coat aluminum surfaces in contact with concrete with isolation paint, sealant, or isolation tape cut to neat line.
- G. Seal all joints.
- H. Glazing: As specified in Section 08 80 00, Glazing.

### 3.03 PERFORMANCE TESTS

- A. Air Leakage Through Assembly: Maximum 0.06 cfm per minute per square foot of wall area, as measured in accordance with ASTM E283 for the design pressure calculated for the Project location.
- B. Resistance to Water Infiltration: No leaks in the complete system when tested in accordance with ASTM E331 at maximum design pressure calculated for the Project location.
- C. Performance Under Uniform Loading:
  - 1. Test in accordance with the International Building Code (IBC) maximum design pressures for the Project location.
  - 2. Maximum Deflection: Not to exceed 1/175 of member span.
  - 3. When Load is Removed: No permanent deformation or damage.



3.04 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for preinstallation meeting, installation assistance, inspection and certification of proper installation, and performance testing of specified equipment.

3.05 CLEANING

- A. After erection, protect exposed portions from damage by machines, plaster, lime, paint, acid, cement, or other harmful compounds.
- B. Remove protective materials and clean with plain water, water with soap, or household detergent.

3.06 PROTECTION

- A. Protect adjacent areas and finish surfaces from damage during product installation.

3.07 SCHEDULES

- A. For tabulation of door and frame characteristics, such as size, type, detail, and finish hardware requirements, see Door and Hardware Schedules on Drawings.

**END OF SECTION**



**SECTION 08 45 00  
TRANSLUCENT WINDOW ASSEMBLIES**

**PART 1      GENERAL**

**1.01      GENERAL**

- A. Translucent window assemblies on this Project shall meet large impact and developed wind pressures.
- B. Translucent window assemblies are located in the following buildings:
  - 1. Existing Secondary Digester Building.
  - 2. Existing Primary Digester Building.

**1.02      REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
  - 1. American Architectural Manufacturers Association (AAMA):
    - a. 2604, Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions & Panels.
    - b. 1503, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections.
  - 2. ASTM International (ASTM):
    - a. C297/C297M, Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions.
    - b. D572, Standard Test Method for Rubber-Deterioration by Heat and Oxygen.
    - c. D635, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
    - d. D1002, Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal).
    - e. D2244, Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
    - f. D3163, Standard Test Method for Determining Strength of Adhesively Bonded Rigid Plastic Lap-Shear Joints in Shear by Tension Loading.
    - g. D4060, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
    - h. E72, Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.

- i. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- j. E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- k. E699, Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.
- l. E1105, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference.
3. International Code Council (ICC): AC 04, Acceptance Criteria for Sandwich Panels.
4. International Code Council – Evaluation Services (ICC-ES).
5. National Fenestration Rating Council (NFRC): 100, Procedure for Determining Fenestration Product U-Factors.

#### 1.03 DESIGN REQUIREMENTS

- A. Design translucent panel system to accommodate expansion and contraction within system components caused by a cycling temperature range of plus 100 degrees F to 0 degree F without causing detrimental effects to system or components.
- B. Design and size members to withstand dead loads and live loads, as well as wind loads acting perpendicular to panel system as calculated in accordance with applicable building codes and specified design criteria.
- C. System shall accommodate, without damage to system or components or deterioration of perimeter seal(s): Movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; and deflection of structural support framing.

#### 1.04 SUBMITTALS

- A. Action Submittals:
  1. Shop Drawings:
    - a. Indicate fabrication and erection of insulated translucent panels.
    - b. Calculations are to be sealed by the manufacturer's Alabama licensed engineer establishing design basis, criteria used and solutions for design of the Kalwall panel, aluminum framing and all detailed connections to the building structural columns, beams, purlins and girt framing system shown on documents for the panel manufacturer's use.

2. Samples:

- a. Assembled panel at least 14 inches by 24 inches, with specified translucent facings and selected extrusion finishes. Include full size pieces showing joinery, anchorage, expansion provisions, and flashing.
- b. Aluminum extrusions finished with scheduled or specified colors for finish selection.

B. Informational Submittals:

1. Translucent panel system manufacturer's Installer's qualification in writing by panel manufacturer citing five projects installed of a similar size in Alabama. Informational Submissions:

- a. Test Reports: To be furnished by systems manufacturer in accordance with Division 1, General Requirements. The manufacturer shall submit certified test reports by an independent testing organization for each type and class of panel system. Reports shall verify that the material will meet all performance requirements of this Specification. Previously completed test reports will be acceptable if by current manufacturer and indicative of products used on this Project. Test reports required are:
  - 1) Flame Spread and Smoke Developed (ASTM E84 by UL 723).
  - 2) Burn Extent (ASTM D635).
  - 3) Color Difference (ASTM D2244).
  - 4) Impact Strength (UL 972).
  - 5) Hurricane Missile Impact Resistance (FBC TAS 201-94, 202-94, 203-94).
  - 6) Tensile Bond Strength (ASTM C297 after aging by ASTM D1037).
  - 7) Shear Bond Strength (ASTM D1002) after five different aging conditions.
  - 8) Beam Bending Strength (ASTM E72).
  - 9) Insulation "U" Factor (by NFRC 100; ASTM C236; E1423 and C1199).
  - 10) NFRC Certification.
  - 11) Condensation Resistance Factor (AAMA 1503).
  - 12) Class A Roof Covering Burning Brand (ASTM E108).

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Erection shall be by an installer who has been in the business of erecting and installing specified materials for at least five consecutive years and can show evidence of satisfactory completion of projects of similar size, scope and type.
- B. Submittal drawings and panel calculations to be reviewed and stamped by a Alabama registered engineer.
- C. Translucent panel design, materials and installation shall meet current requirements of the International Building Code.
- D. Materials and products shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least 10 consecutive years and which can show evidence of these materials being satisfactorily used on at least five projects on Alabama of similar size, scope and type within such a period. At least two projects shall have been in successful use for 10 years or longer.
- E. Performance Requirement: The manufacturer shall be responsible for the configuration and fabrication of the complete panel system.
- F. Product Options: Drawings indicate size, dimensions and profile to structural translucent panel system. Specifications indicate performance required. Other manufacturers that can meet portions of this Specification and wish to be considered alternates must comply with Division 1, General Requirements, and can offer alternate bids for consideration using those guidelines.
- G. Panel System Manufacturer: Able to meet all the code requirements of construction in a high velocity wind zone as defined by the International Building Code.
- H. Installer: Approved by manufacturer.
- I. Deflection of entire Wall and Canopy system shall be no more than  $L/180$ , unless otherwise indicated.
- J. Structural Loads: Provide system capable of handling the following loads when supporting full dead load.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions in system installation areas and indicate if dimensions on shop drawings are actual or guaranteed dimensions.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store translucent panels on long edge, several inches above ground, blocked and under cover to prevent warping.
- B. Ship units assembled and ready for erection.

1.08 WARRANTY

- A. General Warranty: Any warranties specified in this section shall not alter or change Owners rights and provisions received under other Contract Documents and shall be in addition to those Documents.
- B. Special Warranty: System manufacturer shall provide written agreement to repair or replace all defective panel and system craftsmanship for a period of 5 years, starting at date of delivery. Installer shall provide 5-year warranty against leakage starting from date of installation completion. In addition, manufacturer shall warrant their panel assembly for an additional 5 years covering panel delamination affecting structural strength and color change greater than 8 units caused by normal weathering. Should the panels fail to perform within 10 years from the date of delivery, the liability of the manufacturer is limited to repair or replacement of the defective panels, prorated after 5 years.
- C. Manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as Special Guarantee. Special Guarantee shall provide for correction, or at option of Owner, removal and replacement of Work specified in this Specification section found defective during period of 10 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in General Conditions. Warranty shall cover the (UV) discoloring, delamination and weather failure of the assembly.
- D. Conditions:
  - 1. Joint guarantee signed by Contractor, installer, and manufacturer.
  - 2. No leakage of water to interior starting from the date of Substantial Completion.

## **PART 2 PRODUCTS**

### **2.01 PERFORMANCE REQUIREMENTS**

- A. Design Criteria as established by Structural Drawings and minimum positive and negative developed wind pressures as shown on Window Schedules on Drawings.
- B. Impact resistance as defined by the International Building Code.
- C. Air/Water Infiltration: For Water Penetration, wall panel system shall be tested per procedures of ASTM E331, and shall show no water entry at WTP = 10.00 psf, at 5.00 gph/ft squared. Test shall be performed before and after uniform loads are applied. For Air Leakage, system shall be tested per procedures of ASTM E283, and shall show results of no more than 0.01 cfm/ft. squared at 1.56 psf (25 mph) and 0.01 cfm/ft, squared at 6.24 psf (50 mph).

### **2.02 MANUFACTURERS**

- A. Materials and products specified in this section shall be products of:
  - 1. Kalwall Corp., Manchester, NH.
  - 2. No like, equivalent, "or-equal", or "substitute" item is permitted.

### **2.03 MATERIALS**

- A. Translucent Fiberglass Face Sheets:
  - 1. Translucent fiberglass faces shall be manufactured from glass fiber reinforced thermoset resins by insulated system fabricator specifically for architectural use. Thermoplastic (e.g., polycarbonate, acrylic) faces are not acceptable.
  - 2. Flammability: Wall panel and ceiling panels' interior face sheet shall be UL listed and have a flame spread rating no greater than 50 and smoke developed no greater than 250 when tested in accordance with UL 723.
  - 3. Canopy panels' interior face sheet shall be UL listed and have a flame spread rating no greater than 10 and smoke developed no greater than 350-400 when tested in accordance with UL 723.
  - 4. Burn extent by ASTM D635 shall be no greater than 1-inch. Faces shall not deform, deflect or drip when subjected to fire or flame, or become detached when subjected to 300 degrees F for 25 minutes.



5. Weatherability: The full thickness of the exterior face shall not change color more than 3.0 Hunter or CIE Units DELTA E by ASTM D2244 after 5 years outdoor weather at 5 degrees facing South, determined by the average of at least three white samples with and without a protective film or coating to ensure maximum, long-term color stability.
6. The exterior face shall have a permanent glass veil erosion barrier integrally embedded to provide maximum long-term resistance to fiber exposure. Sacrificial plastic surface films, coatings or veils not acceptable.
7. Wall panels' exterior face sheet shall be smooth, 0.060-inch thick and white in color. Canopy panels' exterior face sheet shall be smooth, 0.060-inch thick and white in color. Interior face sheets shall be 0.060-inch thick and white in color. Faces shall not vary more than plus or minus 10 percent in thickness and be uniform in color.
8. Manufacturers engineering may reduce specific face sheet thickness during the Shop Drawing process.
9. Panel system shall be 2-3/4 inches thick, made of two sheets of translucent fiberglass, bonded by heat and pressure to either an aluminum or composite grid core specifically for architectural use.
10. Thermal Insulation: Panels shall have a NFRC laboratory tested "U" factor of 0.23 for walls; 0.53 "U" factor for canopy roof and ceiling by ASTM C236, E1423 and C1199. Wall System shall be NFRC certified with a 0.33 "U" factor.
11. Light and Solar Transmission: Wall panels shall have a light transmission of 15 percent and solar heat gain coefficient of 0.23 per ASTM E972. Canopy panels shall have a light transmission of 20 percent and solar heat gain coefficient of 0.38 per ASTM E972.

B. Grid Core:

1. Grid pattern shall be nominal 12-inch by 24-inch shoji for walls / reversed 12 inches by 24 inches for canopy and symmetrical about the horizontal center line for each flat panel.
2. Wall panels shall incorporate a thermally broken I-beam grid core of 6063-T6 or 6005-T5 with provisions for mechanical interlocking of muntin-mullion and perimeter. Canopy panels shall incorporate an aluminum I-beam grid core. Width of I-beam shall be no less than 7/16 inch. The I-beam grid shall be machined to tolerances of not greater than plus or minus 0.002 inch. Thermal break shall be 1-inch wide minimum.
3. Panels shall withstand 1,200 degrees F fire for minimum 1 hour without collapse or exterior flaming.

C. Adhesive:

1. The laminate adhesive shall be heat and pressure resin-type engineered for structural sandwich panel use, with minimum 25 years field use. Adhesive shall pass testing requirements specified by the International Conference of Building Officials "Acceptance Criteria for Sandwich Panel Adhesive."
2. Minimum strength shall be 750 psi tensile strength by ASTM C97 after two exposures to six cycles each of the aging conditions prescribed by ASTM D1037.
3. Shear strength by ASTM D1002 minimum after exposures to five separate aging conditions:
  - a. 50 Percent Relative Humidity at 73 degrees F: 540 psi.
  - b. 182 degrees F: 100 psi.
  - c. Accelerated Aging by ASTM D1037 at room temperature: 800 psi.
  - d. Accelerated Aging by ASTM D1037 at 182 degrees F: 250 psi.
  - e. 500 Hour Oxygen Bomb by ASTM D572: 1400 psi.

D. Impact Resistance: Fiberglass sandwich panels shall meet the Hurricane wind borne debris requirements per the International Building Code.

E. Translucent structural sandwich panel shall be a true sandwich panel of flat fiberglass sheets bonded to a grid core of mechanically interlocking I-beams and shall be laminated under a controlled process of heat and pressure, and deflect no more than 1.9 inches at 30 psf in 10 feet by ASTM E72.

F. The adhesive bonding line shall be straight, cover the entire width of the I beam and have a neat, sharp edge. In order to insure bonding strength, white spots at intersections of muntins and mullions shall not exceed four for each 40 square feet of panel, nor shall they be more than 3/36 inch in width.

G. Panels and aluminum perimeter frame shall be pre-assembled where practical and sealed at the factory. Panels should be shipped to the job site in rugged shipping units, ready for erection.

H. Perimeter Closure System, Battens and Aluminum Finishes:

1. Closure system shall be extruded 6063-T6 and 6063-T5 aluminum clamp-tite screw type. Curved closure system may be roll formed.
2. Aluminum closures to be supplied with 300 series stainless steel screws (excluding final fasteners to building) and shall be factory sealed to the panels. Aluminum battens and cap plates shall be field installed.

3. All exposed aluminum to be architectural corrosion resistant finish which meets the performance requirements of AAMA 2604, color to be selected from manufacturer's standards.
4. Flexible sealing tape shall be manufacturer's standard pre-applied to serrated edges of closure system at factory under controlled conditions.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not install systems until conditions adversely affecting installation and performance have been corrected.

#### **3.02 PREPARATION**

- A. The general contractor shall prepare openings including isolating dissimilar materials from aluminum system which may cause damage by electrolysis and shall provide temporary enclosures if required.

#### **3.03 INSTALLATION**

- A. The installer shall erect translucent panel system in strict accordance with approved shop drawings as supplied by manufacturer, including fastening and sealing. All surfaces shall be cleaned before sealants are applied.
- B. Secure non-moveable joints and accommodate thermal and mechanical movements.
- C. If required, insure weep holes are correctly installed.
- D. After other trades have completed work on adjacent material, inspect translucent panel installation and make any adjustments necessary to ensure proper installation and weather-tight conditions.
- E. All staging and lifts required for the complete panel system installation and field measuring shall be provided by and maintained by the Contractor.

#### **3.04 CLEANING**

- A. Clean panel system, both sides, after installation according to manufacturer's recommendations.

### **END OF SECTION**



**SECTION 08 71 00  
DOOR HARDWARE**

**PART 1      GENERAL**

**1.01      SUMMARY**

- A.    Section Includes: Finish Hardware for door openings, except as otherwise specified herein.
  - 1.    Door hardware for other doors indicated.
  - 2.    Master Keying System and keyed cylinders.
- B.    Related Sections:
  - 1.    Section 08 16 13, Fiberglass Doors and Frames.
  - 2.    Section 08 14 00, Wood Doors and Steel Frames.
  - 3.    Section 08 41 13, Aluminum-Framed Entrances and Storefronts.
  - 4.    Section 28 00 00, Electronic Safety and Security.
  - 5.    Section 28 10 00, Electronic Access Control and Intrusion Detection.
- C.    References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.
  - 1.    Builders Hardware Manufacturing Association (BHMA).
  - 2.    NFPA 101 Life Safety Code.
  - 3.    NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
  - 4.    ANSI-A156.xx- Various Performance Standards for Finish Hardware.
  - 5.    UL10C – Positive Pressure Fire Test of Door Assemblies.
  - 6.    ANSI-A117.1 – Accessible and Usable Buildings and Facilities.
  - 7.    DHI /ANSI A115.IG – Installation Guide for Doors and Hardware.
  - 8.    ICC – International Building Code.
- D.    Intent of Hardware Groups:
  - 1.    Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
  - 2.    Exterior Doors meet developed wind pressures and applicable third party testing documentation include specific hardware. Hardware sets for exterior doors will be modified as required to match testing requirements.

3. Where items of hardware are not definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by Addendum; or, furnish such items in the type and quality established by this Specification, and appropriate to the service intended.

~~E. Allowances: Refer to Division 1, General Requirements for allowance amount and procedures.~~

~~F.~~E. Alternates: Refer to Division 1, General Requirements for Alternates and procedures.

## 1.02 SUBSTITUTIONS

- A. Comply with Division 1, General Requirements.

## 1.03 SUBMITTALS

- A. Comply with Division 1, General Requirements.
- B. Special Submittal Requirements: Combine submittals of this section with Specifications listed under paragraph 1.01.B ensure the "design intent" of the system/assembly is understood and can be reviewed together.
- C. Product Data: Manufacturer's specifications and technical data including the following:
- D. Detailed specification of construction and fabrication.
  1. Manufacturer's installation instructions.
  2. Wiring diagrams for each electric product specified. Coordinate voltage with electrical before submitting.
  3. Submit 6 copies of catalog cuts with hardware schedule.
  4. Provide 9001-Quality Management and 14001-Environmental Management for products listed in Materials Section 2.2.
- E. Shop Drawings - Hardware Schedule: Submit six complete reproducible copy of detailed hardware schedule in a vertical format.
  1. List groups and suffixes in proper sequence.
  2. Completely describe door and list architectural door number as it appears in construction documents.
  3. Manufacturer, product name, and catalog number and cut sheets.
  4. Function, type, and style.
  5. Size and finish of each item.

6. Mounting heights.
  7. Explanation of abbreviations and symbols used within schedule.
  8. Detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening.
- F. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.
1. Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.
- G. Samples: (If requested by the Architect):
1. 1 sample of Lever and Rose/Escutcheon design, (pair).
  2. 3 samples of metal finishes.
- H. Contract Closeout Submittals: Comply with Division 1 including specific requirements indicated.
1. Operating and maintenance manuals: Submit three sets containing the following.
    - a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
    - b. Catalog pages for each product.
    - c. Name, Address, and phone number of local representative for each manufacturer.
    - d. Parts list for each product.
  2. Copy of final hardware schedule, edited to reflect, "As installed".
  3. Copy of final keying schedule.
  4. As installed "Wiring Diagrams" for each piece of hardware connected to power, both low voltage and 110 volts.
  5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

#### 1.04 QUALITY ASSURANCE

- A. Comply with Division 1, General Requirements.
1. Statement of qualification for distributor and installers.
  2. Statement of compliance with regulatory requirements and single source responsibility.

3. Distributor's Qualifications: Firm with 3-years experience in the distribution of commercial hardware.
    - a. Distributor to utilize full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
    - b. Hardware Schedule shall be prepared and signed by an AHC.
  4. Installer's Qualifications: Firm with 3-years experienced in installation of similar hardware to that required for this Project, including specific requirements indicated.
  5. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.
    - a. Provide UL listed hardware for labeled and 20-minute openings in conformance with requirements for class of opening scheduled.
    - b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.
  6. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.
- B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping: Comply with Division 1, General Requirements.
1. Deliver products in original unopened packaging with legible manufacturer's identification.
  2. Package hardware to prevent damage during transit and storage.
  3. Mark hardware to correspond with "reviewed hardware schedule".
  4. Deliver hardware to door and frame manufacturer upon request.
- B. Storage and Protection: Comply with manufacturer's recommendations.

#### 1.06 PROJECT CONDITIONS

- A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.
- B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.



1.07 WARRANTY

- A. Refer to Conditions of the Contract.
- B. Manufacturer's Warranty:
  - 1. Closers: Ten years.
  - 2. Exit Devices: Five Years.
  - 3. Locksets and Cylinders: Three years.
  - 4. All other Hardware: Two years.

1.08 OWNER'S INSTRUCTION

- A. Instruct Owner's personnel in operation and maintenance of hardware units.

1.09 MAINTENANCE

- A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1, General Requirements.
  - 1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
  - 2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
  - 3. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.
- B. Maintenance Service: Submit for Owner's consideration maintenance service agreement for electronic products installed.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

- A. The following manufacturers are approved subject to compliance with requirements of the Contract Documents. Approval of manufacturers other than those listed shall be in accordance with Division 1, General Requirements.

<b><u>Item:</u></b>	<b><u>Manufacturer:</u></b>	<b><u>Approved:</u></b>
Hinges	Stanley	Bommer, McKinney
Locksets	Best	Or equal
Cylinders	Best	Or equal
Exit Devices	Precision Apex	Von Duprin 98/99
Closers	Stanley D4550	Norton 7500

<b><u>Item:</u></b>	<b><u>Manufacturer:</u></b>	<b><u>Approved:</u></b>
Protection Plates	Trimco	Burns, Rockwood
Flush Bolts	ABH	Trimco, Burns
Coordinator and Brackets	Trimco	ABH, Burns
Threshold and Gasketing	National Guard	Reese, Zero

2.02 MATERIALS:

A. Hinges:

1. Template screw hole locations.
2. Minimum of two permanently lubricated non-detachable bearings.
3. Equip with easily seated, non-rising pins.
4. Sufficient size to allow 180-degree swing of door.
5. Furnish hinges with five knuckles and flush concealed bearings.
6. Provide hinge type as listed in schedule.
7. Furnish 3 hinges per leaf to 7-foot 6-inch height. Add one for each Additional 30 inches in height or fraction thereof.
8. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish.
9. UL10C listed for Fire rated doors.

B. Mortise Type Locks and Latches:

1. Tested and approved by BHMA for ANSI A156.13, Series 1000, Operational Grade 1, Extra-Heavy Duty, Security Grade 2 and be UL10C.
2. Furnish UL or recognized independent laboratory certified mechanical operational testing to 4 million cycles minimum.
3. Provide 9001-Quality Management and 14001-Environmental Management.
4. Fit ANSI A115.1 door preparation.
5. Functions and design as indicated in the hardware groups.
6. Solid, one-piece, 3/4-inch (19 mm) throw, anti-friction latchbolt made of self-lubricating stainless steel.
7. Deadbolt functions shall have 1-inch (25 mm) throw bolt made of hardened stainless steel.
8. Latchbolt and Deadbolt are to extend into the case a minimum of 3/8 inch (9.5 mm) when fully extended.
9. Auxiliary deadlatch to be made of one piece stainless steel, permanently lubricated.
10. Provide sufficient curved strike lip to protect door trim.

11. Lever handles must be of forged or cast brass, bronze or stainless steel construction and conform to ANSI A117.1. Levers that contain a hollow cavity are not acceptable.
12. Lock shall have self-aligning, thru-bolted trim.
13. Levers to operate a roller bearing spindle hub mechanism.
14. Mortise cylinders of lock shall have a concealed internal setscrew for securing the cylinder to the lockset. The internal setscrew will be accessible only by removing the core, with the control key, from the cylinder body.
15. Spindle to be designed to prevent forced entry from attacking of lever.
16. Provide locksets with seven-pin removable and interchangeable core cylinders.
17. Each lever to have independent spring mechanism controlling it.
18. Provide electrified locksets are required by security drawings and Specifications.

C. Exit Devices:

1. Exit devices to meet or exceed BHMA for ANSI 156.3, Grade 1.
2. Exit devices to be tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.
3. Exit devices chassis to be investment cast steel, zinc dichromate.
4. Exit devices to have stainless steel deadlocking 3/4 inch through latch bolt.
5. Exit devices to be equipped with sound dampening on touchbar.
6. Non-fire rated exit devices to have cylinder dogging.
7. Non-fire rated exit devices to have 1/4-inch minimum turn hex key dogging.
8. Touchpad to be "T" style constructed of architectural metal with matching metal end caps.
9. Touchbar assembly on wide style exit devices to have a 1/4-inch clearance to allow for vision frames.
10. Provide strikes as required by application.
11. Fire exit hardware to conform to UL10C and UBC 7-2. UL tested for Accident Hazard.
12. The strike is to be black powder coated finish.
13. Exit devices to have field reversible handing.
14. Provide heavy duty vandal resistant lever trim with heavy duty investment cast stainless steel components and extra strength shock absorbing overload springs. Lever shall not require resetting. Lever design to match locksets and latchsets.
15. Provide exit devices compatible with electrified security hardware.

16. Provide 9001-Quality Management and 14001-Environmental Management.
17. Vertical Latch Assemblies to have gravity operation, no springs.
18. Architectural finish 626W to be used on exterior doors.
  - a. Mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.
  - b. BHMA 156.3 – A156.18 Salt Spray Certified 600 Hours 3 X Standard.

D. Exit Devices with Weatherized True Architectural Finish 626W:

1. MIL-STD-810G 509.6 Salt Fog Certified.
2. MIL-STD-810G 510.6 Sand and Dust Certified.
3. MIL-STD-810G 521.4 Icing/Freezing Rain Certified.
4. All Exterior components of the exit device including the Active case cover, Touch bar, device channel, slide channel fillers, Vertical rods, latch covers and device end cap, shall be constructed of a brass base metal then plated in a double dip two-step process of satin nickel and chrome.
5. Exit device shall be available with options of WTS Weatherized touch bar switch and WALW Weatherized Exit alarm (hardwired).
6. Additional non-weatherized electrified options are compatible with the 626W. Non-weatherized options are not recommended for harsh environments.
7. Provide exit devices compatible with electrified security hardware.

E. PUSH-PULLS

1. Solid metal, not plated.
2. Finish: Satin stainless steel No. 630, unless indicated otherwise.
3. Plates: Beveled four edges, square corners.
4. Pulls: Bolted through door.
5. Push Plates: Countersink pull-through bolts and cover with push plate.
6. Types and Manufacturers:

No.	Type Description	BBW	Baldwin
P1	8" x 3/4" Pull handle on plate: 0.050" x 4" x 16", and push plate: 0.050" x 8" x 16"	1017-3B and 47-G	2367 and 2125

- F. Door Closers shall:
1. Tested and approved by BHMA for ANSI 156.4, Grade 1.
  2. UL10C certified.
  3. Provide 9001-Quality Management and 14001-Environmental Management.
  4. Closer shall have extra-duty arms and knuckles.
  5. Conform to ANSI 117.1.
  6. Maximum 2-7/16-inch case projection with non-ferrous cover.
  7. Separate adjusting valves for closing and latching speed, and backcheck.
  8. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions.
  9. Full rack and pinion type closer with 1-1/2 inches minimum bore.
  10. Mount closers on non-public side of door, unless otherwise noted in Specification.
  11. Closers shall be non-handed, non-sized and multi-sized.
- G. Kickplates: Provide with four beveled edges ANSI J102, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.
- H. Mop plates: Provide with four beveled edges ANSI J103, 4 inches high by width less 1 inch on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.
- I. Door Bolts: Flush bolts for wood or metal doors.
1. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 25 for hollow metal label doors.
  2. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 27 at wood label doors.
  3. Manual flush bolts, Certified ANSI/BHMA 156.16 at openings where allowed local authority.
  4. Provide Dust Proof Strike, Certified ANSI/BHMA 156.16 at doors with flush bolts without thresholds.
- J. Coordinator and Brackets: Provide a surface mounted coordinator when automatic bolts are used in the hardware set.
1. Coordinator, Certified ANSI/BHMA A1156.3 Type 21A for full width of the opening.
  2. Provide mounting brackets for soffit applied hardware.
  3. Provide hardware preparation (cutouts) for latches as necessary.

K. Weatherstripping: Provide at head and jams only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weatherstrip is used with parallel arm mounted closers install weatherstrip first.

1. Weatherstrip shall be resilient seal of (Neoprene, Polyurethane, Vinyl, Pile, Nylon Brush, Silicone).
2. UL10C Positive Pressure rated seal set when required.

L. Door Bottoms/Sweeps: Surface mounted or concealed door bottom where listed in the hardware sets.

1. Door seal shall be resilient seal of (Neoprene, Polyurethane, Nylon Brush, Silicone).
2. UL10C Positive Pressure rated seal set when required.

M. Thresholds: Thresholds shall be aluminum beveled type with maximum height of 1/2 inch for conformance with ADA requirements. Furnish as specified and per details. Provide fasteners and screws suitable for floor conditions.

N. STOPS AND HOLDERS

1. BHMA A156.16.
2. Machine Screws: In threaded anchors at concrete or masonry.
3. Self-Tapping Screws: At stud partitions, wood, or metal mountings.
4. Finish: Satin chromium-plated No. 626.
5. Types and Manufacturers for Each Leaf:

No.	Type Description	BBW or GJ	Baldwin	BHMA
S1	Floor stop	F121X	4086	L02131
S2	Wall bumper	WC9X	4031	L02241

O. ELECTRIC STRIKE

1. For mortise Locks (with or without panic hardware):
  - a. Materials: stainless steel.
  - b. Surface mounted.
  - c. Endurance 1,000,000 cycles.
  - d. Fire rated.
  - e. UL 294 listed for access control systems.
  - f. Locknetics MDS100 Door strike
  - g. 300 mA @ 12V dc.
  - h. 3xLogic Model Number: S-STRK-MDS100-32D.

2.03 FINISH

- A. Designations used in Schedule of Finish Hardware paragraph 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products.
- B. Powder coat door closers to match other hardware, unless otherwise noted.
- C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

2.04 KEYS AND KEYING

- A. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner.
- B. Cylinders, removable and interchangeable core system: Best CORMAX™ Patented seven-pin.
- C. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate."
- D. Transmit Grand Masterkeys, Masterkeys and other Security keys to Owner by Registered Mail, return receipt requested.
- E. Furnish keys in the following quantities:
  - 1. One each Grand Masterkeys.
  - 2. Four each Masterkeys.
  - 3. Two each Change keys each keyed core.
  - 4. Fifteen each Construction Masterkeys.
  - 5. One each Control keys.
- F. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.
- G. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying and programming complies with project requirements. Furnish three typed copies of keying and programming schedule to Architect.

## **PART 3      EXECUTION**

### **3.01      EXAMINATION**

- A.    Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.

- 1.    Do not proceed until unsatisfactory conditions have been corrected.

### **3.02      HARDWARE LOCATIONS**

- A.    Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.

- 1.    Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).
  - 2.    Recommended locations for Architectural Hardware for flush wood doors (DHI).
  - 3.    WDMA Industry Standard I.S.-1A-04, Industry Standard for Architectural wood flush doors.

### **3.03      INSTALLATION**

- A.    Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- B.    Conform to local governing agency security ordinance.
- C.    Install Conforming to ICC/ANSI A117.1 Accessible and Usable Building and Facilities.
  - 1.    Adjust door closer sweep periods so that from the open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.
- D.    Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.



## 3.04 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT

- A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final Shop Drawings.
1. Check and adjust closers to ensure proper operation.
  2. Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.
    - a. Verify levers are free from binding.
    - b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.
  3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

## 3.05 SCHEDULE OF FINISH HARDWARE

## A. Manufacturer List:

<u>Code</u>	<u>Name</u>
AB	ABH Manufacturing Inc.
AD	Adams Rite
BE	Best Access Systems
NA	National Guard
PR	Precision
SD	Stanley Door Closers
BY	By Others
ST	Stanley
TR	Trimco

## B. Finish List:

<u>Code</u>	<u>Description</u>
AL	Aluminum
606	Satin Brass, Clear Coated
625	Bright Chromium Plated
626	Satin Chromium Plated
628	Satin Aluminum, Clear Anodized
630	Satin Stainless Steel
689	Aluminum Painted
626W	Weatherized Satin Chrome
628C	Nylon Silver Coated
GREY	Grey
BLACK	Black
US32D	Stainless Steel, Dull

C. Option List:

<b><u>Code</u></b>	<b><u>Description</u></b>
CD	Cylinder Dogging
FL	Fire Exit Hardware
M5	Galvanized Steel Chain
WC	Padlock Weather Covers
CSK	Counter Sinking Kick / Mop Plates

D. Security Integrator to provide and install all access control hardware components and intrusion detection devices required by the security design. Refer to Security Detail Drawings and Sections 28 00 00, Electronic Safety and Security and 28 10 00, Electronic Access Control and Intrusion Detection.

E. See Door and Hardware Schedule on the Drawings for doors with electronic hardware.

F. Hardware Sets:

**SET #1 – Wood Doors (Privacy Set with key)**

BHMA Function # 04 Office with thumb turn and entry lock

3 EA Hinge  
1 EA Privacy Lockset  
1 EA regular arm door Closer  
1 EA Wall Stop  
3 EA Silencer

**SET #2 – Wood Doors (Passage)**

BHMA Function # 01 Passage function

3 EA Hinge  
1 EA Passage Lockset  
1 EA regular arm door closer  
1 EA Wall Stop  
3 EA Silencer

**SET #3 – Wood Doors (Storage Set)**

BHMA Function # 05 Classroom lock function

3 EA Hinge  
1 EA Storage Lockset  
1 EA regular arm door Closer  
1 EA Wall Stop  
3 EA Silencer

**SET #4 – Wood Doors**

BHMA Function # 01 Passage function

- 3 EA Hinge
- 1 EA Exit Device Rim type with Lever Trim
- 1 EA Parallel arm door Closer
- 1 EA Kick Plate
- 3 EA Silencer
- 1 EA Threshold

**SET #5 – Wood Doors**

BHMA Function # 01 Passage function

- 3 EA Hinge
- 1 EA Lockset
- 1 EA Regular arm OR Parallel door Closer
- 1 EA Kick Plate
- 3 EA Silencer
- 1 EA Threshold

**SET #5A – Aluminum and Glass Entrance Doors**

Specification Section 08 41 13, Aluminum-Framed Entrances and Storefronts  
Exterior- Impact Resistant tested assembly

- 3 EA Hinge
- 1 EA Rim Type Exit Device
- 1 EA Lockset with Lever Handle
- 1 EA Parallel Door Closer with integral stop
- 1 EA Jamb and head door Weather-stripping
- 1 EA Door Sweep
- 1 EA Threshold , aluminum anodized serrated
- 1 EA Pull

**SET #6 – FRP Flush Double Door**

BHMA Function # 12,13 Entrance lock function active leaf

- 3 Pair Hinges
- 1 Lockset
- 1 Rim Type Exit Device
- 2 EA Parallel Door Closer with integral stop and hold-open.
- Top and Bottom Flush Bolts for Inactive Leaf

- 1 Set jamb and head Seals for each section pair
- 1 Rain Drip (for exterior doors)
- 2 EA Door Shoe
- 2 EA Kick Plate (for interior doors)
- 1 EA Threshold Anodized Aluminum serrated (for exterior doors or interior doors between conditioned and non-conditioned spaces or fire rated walls.)

**SET #6A – FRP Flush Double Sectional Door**

BHMA Function # 12,13 Entrance lock function for exterior doors  
Both Active Doors/exterior- Impact Resistant tested assembly

BHMA Function # 01 Passage function for interior doors

- Hinges designed by door manufacturer for door section heights
- Astragals for each section pair
- Flush Bolts designed by door manufacturer
- 2 EA Lockset
- 2 EA Parallel Door Closer with integral stop and hold-open.
- 1 Set jamb and head Seals for each section pair
- 1 Rain Drip (for exterior doors)
- 2 EA Door Shoe
- 2 EA Kick Plate
- 1 EA Threshold Anodized Aluminum serrated (for exterior doors)

**SET #7 – FRP Single Exterior Door (Electric Strike as indicated in Doors Frames & Hardware Schedule on the drawings)**

BHMA Function # 12,13 Entrance lock function  
Exterior- Impact resistant tested assembly

- 3 EA Hinge
- 1 EA Rim Type Exit Device
- 1 EA Lockset
- 1 EA Parallel Door Closer with integral stop
- 1 Set jamb and head seals
- 1 EA Rain Drip
- 1 EA Door Shoe
- 1 EA Threshold Clear Aluminum serrated

**SET #8 – FRP Single Interior Door**

BHMA Function # 01 Passage function

- 3 EA Hinge
- 1 EA Rim Type Exit Device with Lever Trim
- 1 EA Parallel Door Closer with integral stop
- 1 Set jamb and head seals
- 1 EA Door Shoe
- 1 EA Threshold Clear Aluminum serrated

**SET #9 – FRP Single Interior Door**

BHMA Function # 01 Passage function.

- 3 EA Hinge
- 1 EA Lockset
- 1 EA Regular arm Door Closer with integral stop
- 1 EA Door Shoe
- 1 EA Threshold Clear Aluminum serrated

**SET #9A – FRP Single Interior Door**

BHMA Function # 04 Office with thumb turn and entry lock

- 3 EA Hinge
- 1 EA Privacy Lockset
- 1 EA Regular arm door Closer
- 1 EA Wall Stop
- 3 EA Silencer

**SET #10 – Overhead Coiling Door**

- 1 EA Lock by door manufacturer.

**END OF SECTION**



**SECTION 08 80 00  
GLAZING**

**PART 1 GENERAL**

**1.01 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
1. American National Standards Institute (ANSI): Z97.1, Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test.
  2. American Society of Civil Engineers (ASCE): 7, Minimum Design Loads for Buildings and Other Structures.
  3. ASTM International (ASTM):
    - a. C509, Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
    - b. C864, Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
    - c. C920, Standard Specification for Elastomeric Joint Sealants.
    - d. C1036, Standard Specification for Flat Glass.
    - e. C1048, Standard Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass.
    - f. C1115, Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.
    - g. C1172, Standard Specification for Laminated Architectural Flat Glass.
    - h. C1193, Standard Guide for Use of Joint Sealants.
    - i. C1376, Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.
    - j. D635, Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
    - k. D2843, Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
    - l. D4802, Standard Specification for Poly(Methyl Methacrylate) Acrylic Plastic Sheet.
    - m. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
    - n. E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
    - o. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.

- p. E1300, Standard Practice for Determining Load Resistance of Glass in Buildings.
- q. E1425, Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems.
- r. E1886, Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
- s. E1996, Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
- t. E2190, Standard Specification for Insulating Glass Unit Performance and Evaluation.
- 4. Consumer Product Safety Commission (CPSC) Code of Federal Regulations (CFR): 16 CFR 1201, Safety Standard for Architectural Glazing Materials.
- 5. Glass Association of North America (GANA):
  - a. Glazing Manual.
  - b. Sealant Manual.
- 6. National Fenestration Rating Council Incorporated (NFRC):
  - a. 100, Procedure for Determining Fenestration Product U-Factors.
  - b. 200, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
  - c. 300, Standard Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.
- 7. National Fire Protection Association (NFPA):
  - a. 80, Safety Standard for Fire Doors and Other Opening Protectives.
  - b. 252, Safety Standard Methods of Fire Tests of Door Assemblies.
  - c. 257, Safety Standard on Fire Test for Window and Glass Block Assemblies.
- 8. South Coast Air Quality Management District: SCAQMD Rule 1168 - Adhesive and Sealant Applications.
- 9. Underwriters Laboratories, Inc. (UL):
  - a. 752, Standard for Bullet-Resisting Equipment.
  - b. Building Materials Directory.
  - c. 10C, Standard for Safety for Positive Pressure Fire Tests of Door Assemblies.



## 1.02 SUBMITTALS

### A. Action Submittals:

1. Shop Drawings:
  - a. Complete schedule of glass and glazing material to be used for each purpose.
  - b. Indicate sizes, layout, thicknesses, and loading conditions for glass.
2. Product Data:
  - a. Catalog cuts of glazing materials with inclusion of glass edge cutting procedures.
  - b. Glass: Provide structural, physical, and thermal and solar optical performance characteristics, size limitations, special handling or installation requirements.
  - c. Glazing Sealants, Compounds, and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors where exposed.
  - d. Seismic anchorage and bracing drawings and data sheets, as required by Section 01 88 15, Anchorage and Bracing.
3. Samples:
  - a. Glass: Two samples 12 by 12 inches in size of each type of glass, illustrating each glass units, coloration and design properly labeled.
4. otherwise noted.

### B. Informational Submittals:

1. Design calculations for glass thicknesses. Signed and sealed by professional Engineer registered in Alabama.
2. Seismic anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
3. Manufacturer's Certificate of Compliance for each type of glazing, in accordance with Section 01 61 00, Common Product Requirements.
4. Details and methods of glazing for each type of glazing condition; include manufacturer's recommendations for setting, sealing materials, and installing each type of glazing.
5. Documentation declaring compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealants and other glazing materials.
6. Documentation of glazer's previous experience and manufacturer's approval.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing Work of this section with minimum 3 years' documented experience approved by manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Storage:

1. Support cases on both sides when stored vertically.
2. After unpacking, place interleaving protection between lites.
3. Keep glass and interleaving dry by storing inside where temperatures are above dewpoint, or if outside storage is necessary, cover glass interleaving with opaque tarpaulins or plastic and inspect periodically. Wet interleaving can stain glass.
4. Avoid exposing stored glass to direct sunlight.

B. Handling:

1. Stack individual lites on edge and lean them against sturdy uprights at a slope of 5 degrees to 7 degrees from vertical.
2. Cushion bottom edges with soft, firm pads free of dirt, grit, glass chips, or other foreign material.
3. Do not rotate or cartwheel insulating glass units over their corners. Use turning device such as a rolling block if units must be rotated.

1.05 SPECIAL GUARANTEE

- A. Provide manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as Special Guarantee. Special Guarantee shall provide for correction, or at option of Owner, removal and replacement of Work specified in this Specification section found defective during a period of 10 years for vertical application insulating glass after date of Substantial Completion. Guarantee to cover deterioration because of normal conditions of use and not because of handling installing and cleaning practices performed contrary to glass manufacturer's published instructions. Duties and obligations for correction or removal and replacement of defective Work shall be as specified in General Conditions.

## **PART 2      PRODUCTS**

### **2.01      GENERAL**

- A. Single Source Fabrication Responsibility: Fabrication processes including Low-E and reflective coatings, insulating, laminating, fire-rating, silkscreen, and tempering, shall be fabricated by a single fabricator.
- B. Performance/Design Criteria:
  - 1. Provide glass and glazing materials for continuity of building enclosure vapor retarder and air barrier:
    - a. In conjunction with vapor retarder and air barrier materials described in section.
    - b. To utilize inner pane of multiple pane sealed units for continuity of air barrier and vapor retarder seal.
    - c. To maintain continuous air barrier and vapor retarder throughout glazed assembly from glass pane to heel bead of glazing sealant.
  - 2. Glass Thickness: Select minimum thickness in accordance with ASTM E1300 to resist specified design loads with the following maximum probability of breakage:
    - a. Vertical Glass: Eight lites per 1,000 for wind loads with 60 seconds maximum load duration.
    - b. Minimum Thickness: 1/4 inch for exterior glass.
    - c. Impact resistant for wind-borne debris as required below.
- C. Structural Design: Design in accordance with International Building Code for most critical combination of wind, snow, seismic, and dead loads.
- D. Wind Loads: Design and size glass to withstand positive and negative wind loads acting normal to plane of wall, including increased loads at building corners.
  - 1. Design Wind pressures for components and cladding as shown on the Structural Drawings.
  - 2. Wind-Borne Debris Loads: Design and size glass located less than 60 feet (18.288 m) abovegrade to withstand the following loads:
    - a. Glass Within 30 Feet (9.144 m) of Grade: ASTM E1886 and ASTM E1996; large missile impact test.
    - b. Glass Greater than 30 Feet (9.144 m) Abovegrade: ASTM E1886 and ASTM E1996; small missile impact test.
  - 3. Exterior Glass Deflection: Maximum of 1/175 of glass edge length or 3/4 inch (19 mm), whichever is less with full recovery of glazing materials.

4. Interior Glass Deflection: Maximum differential deflection for two adjacent unsupported edges when 50 plf (730 N/m) force is applied to one panel at any point up to 42 inches (1067 mm) above finished floor less than thickness of glass.
  5. Thermal and Solar Optical Performance: Measured or calculated in accordance with the following:
    - a. U-Values: NFRC 100.
    - b. Solar Heat Gain Coefficients: NFRC 200.
    - c. Solar Optical Properties: NFRC 300.
- E. Recycled Content Materials: Furnish materials with recycled content including post-consumer and pre-consumer recycled content.

## 2.02 FIRE RATED GLASS

- A. Manufacturer: FireLite® as manufactured by Nippon Electric Glass Company, Ltd., and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 phone (800.426.0279) fax (425.396.8300) e-mail [sales@fireglass.com](mailto:sales@fireglass.com), web site <http://www.fireglass.com> or approved equal.

## 2.03 FLOAT GLASS PRODUCTS

A. Clear Glass (Interior):

1. Heat strengthened (FG-CH) or Tempered (FC-CT) float glass as specified; Class 1 clear.
2. Minimum Thickness: 1/4 inch.

B. Low E Glass (Exterior):

1. Heat strengthened, tinted (FG-ETH) or tempered float glass as specified; Class 2 tinted.
2. Minimum Thickness: 1/4 inch.
3. Tint: As selected.
4. Coating: ASTM C1376; pyrolytic.

C. Manufacturers:

1. Viracon.
2. ACH Glass Operations
3. AFG Industries, Inc.
4. Oldcastle Glass.

## 2.04 INSULATING GLASS PRODUCTS

### A. Laminated Insulating Glass (All exterior windows and door windows):

1. ASTM E2190 certified by Insulating Glass Certification Council and Insulating Glass Manufacturers Alliance; with glass elastomer edge seal; place reflective film within unit; purge interpane space with dry hermetic air.
2. Total Unit Thickness: 1-5/16 inch unless otherwise indicated.
3. Insulating Glass Unit Edge Seal Construction: Stainless steel, thermally broken, bent and soldered corners.
  - a. StormGuard by Viracon or approved equal.

## 2.05 GLAZING SEALANTS

### A. Elastomeric Glazing Sealants: Materials compatible with adjacent materials including glass, insulating glass seals, and glazing channels.

1. Silicone Glazing Sealant: ASTM C920, Type S, Grade NS, Class and Use suitable for glazing application indicated; single component curing; capable of water immersion without loss of properties; nonbleeding, nonstaining, cured Shore A Hardness Range 15 to 25.

### B. Dense Gaskets:

1. Resilient extruded shape to suit glazing channel retaining slot; black.
2. Neoprene: ASTM C864.
3. EPDM: ASTM C864.
4. Silicone: ASTM C1115.

### C. Soft Gaskets:

1. ASTM C509 Type II; resilient extruded shape to suit glazing channel retaining slot; black.
2. Neoprene.
3. EPDM.
4. Silicone.

### D. Preformed Glazing Tape:

1. Size to suit application.
2. Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.
3. Butyl Corner Sealant: ASTM C920 single component nonskinning butyl compatible with glazing tape; color to match tape.

## 2.06 GLAZING ACCESSORIES

- A. Setting Blocks: Elastomeric material recommended by glass manufacturer, 80 to 90 Shore A durometer hardness, length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Elastomeric material recommended by glass manufacturer, 50 to 60 Shore A durometer hardness, minimum 3-inch (75-mm) long by one half the height of glazing stop by thickness to suit application self-adhesive on one face.
- C. Glazing Clips: Manufacturer's standard type.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify openings for glazing are correctly sized and within acceptable tolerance.
- B. Verify surfaces of glazing channels or recesses are clean, free of obstructions impeding moisture movement, weeps are clear and ready to receive glazing.

### 3.02 PREPARATION

- A. Do not perform glazing work in damp, foggy, or rainy weather, or when temperatures are not within range recommended by GANA "Glazing Manual".
- B. Surfaces:
  - 1. Smooth, even, sound, dry, and clean.
  - 2. Clean contact surfaces with solvent and wipe dry.
- C. Priming:
  - 1. Complete and cured.
  - 2. Prime surfaces scheduled to receive sealant.

- D. Measure size of frames to receive glass and compute actual glass size allowing for edge clearances.
- E. Verify functioning weep system is present.
- F. Do not proceed with glazing until unsatisfactory conditions have been corrected.

### 3.03 GLAZING INSTALLATION

- A. General: Follow recommendations of glass manufacturer GANA “Sealant Manual, GANA “Glazing Manual” and the following:
  - 1. Glazing Sealants: Comply with ASTM C1193.
  - 2. Fire Rated Openings: Comply with NFPA 80.
- B. Exterior Wet/Dry Method (Preformed Tape and Sealant) Installation:
  - 1. Cut glazing tape to length and set against permanent stops, 3/16 inch (5 mm) below sight line. Seal corners by butting tape and dabbing with compatible butyl sealant.
  - 2. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapor seal.
  - 3. Place setting blocks at 1/4 points with edge block no more than 6 inches (150 mm) from corners.
  - 4. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
  - 5. Fill gap between glazing and stop with elastomeric glazing sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch (9 mm) below sight line.
  - 6. Apply cap bead of elastomeric glazing sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.
- C. Interior Dry Method (Tape and Tape) Installation:
  - 1. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.
  - 2. Place setting blocks at 1/4 points with edge block no more than 6 inches (150 mm) from corners.
  - 3. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

4. Place glazing tape on free perimeter of glazing in same manner described above.
5. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
6. Knife trim protruding tape.

### 3.04 FIELD QUALITY CONTROL

#### A. Hose Test:

1. Use 3/4-inch minimum hose without nozzle. With full stream, flood glazing from bottom to top.
2. Correct leaks disclosed by hose test by reglazing and retesting until eliminated.

### 3.05 MANUFACTURER'S FIELD SERVICES

- #### A.
- Provide manufacturer's representative at Site in accordance with Section 01 43 33, Manufacturers' Field Services, for installation assistance and inspection.

### 3.06 CLEANING

- #### A.
- Leave glass and glazing in undamaged condition and ready for final cleaning.
- #### B.
- Remove excess glazing compound from installed glass.
- #### C.
- Remove labels from glass surface at time of final cleaning.
- #### D.
- Wash and polish both faces of glass.
- #### E.
- Clean adjacent surfaces of glass.

### 3.07 PROTECTION OF COMPLETED WORK

#### A. Protection:

1. Keep glass free from contamination by materials capable of staining glass.
2. Install tape across lights secured to frames or structure.
3. No tape or marking allowed on glass.

- #### B.
- Replacements and Repairs: Prior to Substantial Completion, replace broken, defective, or scratched glass and repair damaged compounds.

### **END OF SECTION**



**SECTION 08 90 00**  
**LOUVERS**

**PART 1 GENERAL**

**1.01 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
1. Air Movement and Control Association (AMCA): 500-L, Laboratory Methods of Testing Louvers for Rating.
  2. The Aluminum Association, Incorporated (AA): Designation System for Aluminum Finishes.
  3. ASTM International (ASTM):
    - a. D1187, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
    - b. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  4. Underwriters Laboratories, Inc. (UL): Building Materials Directory.

**1.02 DESIGN REQUIREMENTS**

- A. Wind Loads: Provide louver assemblies and their anchorage to the wall structure that are capable of withstanding the positive and negative wind load pressures shown on the Components and Cladding Wind Surface Pressures table on the Structural Drawings.

**1.03 SUBMITTALS**

- A. Action Submittals:
1. Shop Drawings: Large scale details of louvers, anchorage, and relationship to adjoining construction.
    - a. Manufacturer's Literature: Descriptive and performance data of louvers, including standard drawings and louver-free area.
  2. Samples: Manufacturer's standard finishes and colors.
  3. Product/Code Certification: Provide written verification that submitted louver assembly and installation method meet or exceed Project Design Requirements, in this section, by one, or more, of the following methods as allowed for by IBC:
    - a. Rational Comparative Analysis: Testing data, calculations, and verification documents signed and sealed by a professional engineer registered in the State of Alabama.
    - b. Local product approval by Authority Having Jurisdiction (AHJ).

**B. Informational Submittals:**

1. Factory test data.
2. Certificates of AMCA ratings.
3. Installation instructions.
4. Parts list, if applicable.
5. Maintenance procedures.
6. Special Guarantee.
7. Third party testing documentation or manufacturer's literature qualifying louver assembly as meeting required developed wind pressures for Project as shown on the Components and Cladding Wind Surface Pressures table on the Structural Drawings.

**1.04 SPECIAL GUARANTEE**

- A. Manufacturer's extended guarantee or warranty, with Owner named as beneficiary, in writing, as Special Guarantee. Special Guarantee shall provide for correction, or at option of Owner, removal and replacement of special fluorocarbon or baked-on finish found defective during a period of 20 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in General Conditions.

**PART 2 PRODUCTS**

**2.01 GENERAL**

- A. Hurricane-rated louver sizes are based on 46 percent free area and 500 fpm maximum velocity through free area.
- B. Water Penetration Rate: No greater than 0.02 ounce per square foot.
- C. Louvers: Rated and tested in accordance with AMCA 500-L.
- D. Furnish louvers with interior duct collars.

**2.02 FIXED STORMPROOF LOUVERS (TYPE SP)**

- A. Frame: Extruded aluminum channel, 0.081 inch thick, 4 inches deep, with concealed mullions.
- B. Blades: Extruded aluminum, 0.081 inch thick, Z-shaped, 35-degree to 45-degree pitch angle, spaced 3 inches to 4.25 inches on center.
- C. Pressure Loss: AMCA certified rating of no greater than 0.10-inch WC.

- D. Sizes: As shown on Drawings.
- E. Screen: Inside mounted, painted aluminum, 1/2-inch mesh.
- F. Finish: Kynar 500 fluorocarbon coating.
- G. Manufacturers and Products:
  - 1. Construction Specialties; Model 4110.
  - 2. Dowco; Series LEB-4.
  - 3. Ruskin; Model ELF-375DXH.

#### 2.03 ACCESSORIES

- A. Anchors and Fasteners: Stainless steel.
- B. Flashings: Match louver frame.
- C. Isolation Tape: Tremco 440, 3M EC1202, or Presstite 579.6.
- D. Isolation Paint: ASTM D1187, bituminous coating.

#### 2.04 SOURCE QUALITY CONTROL

- A. Factory Performance Tests:
  - 1. Airflow versus pressure loss.
  - 2. Rain penetration data.

### **PART 3 EXECUTION**

#### 3.01 EXAMINATION

- A. Check openings to ensure dimensions conform to Drawings.
- B. Ensure openings are free of irregularities that would interfere with installation.
- C. Do not install louvers until defects have been corrected.

#### 3.02 INSTALLATION

- A. Install louvers as shown on reviewed Shop Drawings. Coordinate with heating or ventilation ductwork to be connected.
- B. Follow procedures in manufacturer's recommended installation instructions.
- C. Separate aluminum from other metals with isolation tape or paint.

3.03 CLEANING

- A. After erection, protect exposed portions from damage by machines, paint, lime, acid, cement, or other harmful compounds.
- B. Remove protective materials and clean with plain water, water with soap, or household detergents.

**END OF SECTION**

**SECTION 09 29 00  
GYPSUM BOARD**

**PART 1 GENERAL**

**1.01 GENERAL:**

- A. Section includes:
  - 1. Gypsum Board.
  - 2. Non-Structural Framing.
- B. Related sections:
  - 1. Section 07 21 01, Thermal Insulation.
  - 2. Section 08 30 00, Access Doors.
  - 3. Section 09 90 00, Painting and Coating.

**1.02 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
  - 1. American National Standards Institute (ANSI): A118.9, Test Methods and Specifications for Cementitious Backer Units.
  - 2. ASTM International (ASTM):
    - a. A641/A641M, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
    - b. C208, Standard Specification for Cellulosic Fiber Insulating Board.
    - c. C475/C475M, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
    - d. C514, Standard Specification for Nails for the Application of Gypsum Board.
    - e. C645, Standard Specification for Nonstructural Steel Framing Members.
    - f. C665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
    - g. C754, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
    - h. C840, Standard Specification for Application and Finishing of Gypsum Board.
    - i. C1002, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

- j. C1047, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- k. C1177/C1177M, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- l. C1178/C1178M, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
- m. C1396/C1396M, Standard Specification for Gypsum Board.
- n. D4977, Standard Test Method for Granule Adhesion to Mineral Surfaced Roofing by Abrasion.
- o. D5420, Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact).
- p. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- q. E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- r. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
- s. E413, Classification for Rating Sound Insulation.
- t. E695, Standard Test Method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading.
- 3. Gypsum Association (GA):
  - a. 214, Recommended Levels of Gypsum Board Finish.
  - b. 216, Application and Finishing of Gypsum Panel Products.
- 4. Underwriters Laboratories Inc. (UL): UL Fire Resistance Directory.

### 1.03 SUBMITTALS

#### A. Submittals:

- 1. Control joint pattern proposed for gypsum board.
- 2. Control joint pattern proposed for gypsum soffit.
- 3. Manufacturer's list of items and materials proposed for use, with descriptive literature for each system used.
- 4. Manufacturer's product data for adhesives and sealants including printed statement of VOC content and material safety data sheets.

### 1.04 QUALITY ASSURANCE

- #### A. General:
- Regardless of the minimum specifications herein, utilize materials and applications recommended by manufacturer.

- B. Applicator's Qualifications: Use only workers regularly employed in this type of work who can show experience in application of similar materials and specific systems specified.
- C. Single Source Responsibility: Use gypsum board and related joint treatment materials from a single manufacturer for each type used.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver fire-rated materials bearing testing agency label and required fire classification numbers.
- B. Storage:
  - 1. Store materials inside, under cover, stacked flat, off floor.
  - 2. Stack gypsum board so that long lengths are not over short lengths.
  - 3. Avoid overloading floor system of storage area.
  - 4. Store adhesives and finishing compounds in dry areas; protect against freezing at all times.

#### 1.06 ENVIRONMENTAL CONDITIONS

- A. Temperature: In areas receiving gypsum board installation, maintain minimum temperature of 40 degrees F for 48 hours before, during, and after gypsum board application. Maintain minimum temperature of 50 degrees F for 48 hours before, during, and after application of adhesive methods of attachment and finishing compounds until drying is complete.
- B. Ventilation:
  - 1. Provide ventilation during and following adhesives and joint treatment applications.
  - 2. Use temporary air circulators in enclosed areas lacking natural ventilation.
  - 3. Under slow drying conditions, allow additional drying time between coats of joint treatment.
  - 4. Protect installed materials from drafts of ambient air during hot, dry weather.
  - 5. Protect materials from drying too rapidly during hot and dry weather.

## **PART 2 PRODUCTS**

### 2.01 GYPSUM BOARD

- A. Regular Board (GWB): ASTM C1396/C1396M, 5/8-inch thick with tapered edges.

- B. Water-Resistant Board (WRB): ASTM C1396/C1396M, 5/8-inch thick with tapered edges.
- C. Abuse Resistant Board (ARWB): ASTM C1396/C1396M, Type X, 5/8-inch thick as manufactured by:
  - 1. National Gypsum Company; Gold Bond Hi-Abuse Wallboard.
  - 2. United States Gypsum Co.; SHEETROCK Brand Abuse-Resistant Gypsum Panels.

## 2.02 TILE BACKING PANELS

- A. Cementitious Backer Board (CBB):
  - 1. Aggregated portland cement panel reinforced with vinyl-coated, woven fiberglass mesh embedded in both surfaces meeting ANSI A118.9.
  - 2. Thickness: 1/2-inch.
  - 3. Manufacturers and Products:
    - a. Custom Building Products; Wonderboard.
    - b. United States Gypsum; Durock.

## 2.03 FASTENERS

- A. Gypsum Board:
  - 1. Screws: ASTM C1002, self-drilling, self-tapping, bugle head, for use with power-driven tool.
    - a. Type S, 1-inch long for gypsum board to sheet metal.
    - b. Type W, 1-1/4 inches long for gypsum board to wood.

## 2.04 JOINT TREATMENT MATERIALS

- A. Tape:
  - 1. General Interior Applications: ASTM C475/C475M, perforated paper tape.
  - 2. Soffit Board, Glass Mesh Mortar Units, and Cementitious Backer Board: 2-inch wide 10 by 10 open weave glass mesh tape as recommended by manufacturer.
- B. Compound:
  - 1. General Interior Applications: ASTM C475/C475M, all-purpose, ready-mixed compound.
  - 2. Water-Resistant GWB and Soffit Boards: Chemically curing, polyindurate type material as recommended by manufacturer.



2.05 ANCILLARY MATERIALS

- A. Adhesives: As recommended by gypsum board manufacturer for intended use.
- B. Sound Attenuation Blankets: ASTM C665, Type I (no facing), 3 inches thick.
- C. Acoustical Sealant:
  - 1. Nonsetting and nonstaining with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Manufacturers:
    - a. DAP.
    - b. United States Gypsum.
    - c. Tremco.
    - d. Ohio Sealants, Inc.

2.06 TRIM ACCESSORIES

- A. ASTM C1047, Zinc-Coated Metal.
- B. Manufacturers and Products:
  - 1. Corner Bead:
    - a. 1-1/4 inches by 1-1/4 inches:
      - 1) United States Gypsum; Dur-A-Bead.
      - 2) Gold Bond; standard corner beads.
  - 2. Edge Trim:
    - a. United States Gypsum; 200B metal trim.
    - b. Gold Bond; No. 200 casing bead.
  - 3. Metal Control Joint:
    - a. United States Gypsum; No. 093.
    - b. Gold Bond; E-Z strip control joint.

2.07 NONSTRUCTURAL METAL FRAMING MEMBERS

- A. ASTM C645, galvanized C-studs with 1-5/8-inch flanges and C-H studs with J-runners.
- B. Wall studs Gauge and Sizes: 20 GA minimum, size as noted on Drawings and Specifications.
- C. Manufacturers:
  - 1. United States Gypsum.
  - 2. Dale/Incor.
  - 3. Gold Bond.
  - 4. Unimast, Inc.

2.08 LIGHT-GAUGE METAL FRAMING ACCESSORIES

- A. Cold-Rolled Carrying Channel: Cold-rolled steel, 16-gauge metal with minimum 1/2-inch wide flange, galvanized 1-1/2 inches deep.
- B. Cold-Rolled Bridging Channel: Cold-rolled steel, 16-gauge metal with minimum 1/2 inch wide flange galvanized 1-1/2 inches deep.
- C. Cold-Rolled Furring Channel: Cold-rolled steel, 25-gauge metal with minimum 1/2-inch wide flange, galvanized 3/4 inches deep.
- D. Z-Furring: Galvanized 25-gauge, 2-1/2 inch(es) deep.
- E. Hat-Shaped Furring Channels: Roll-formed hat shaped section of 25-gauge galvanized steel with a face width of 1-1/4 inches and a depth of 7/8 inch.
- F. Resilient Furring Channels: Roll-formed section of 25-gauge galvanized steel with face width of 1-1/2 inches designed for resilient attachment of gypsum board to framing.
- G. Hanger Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.
- H. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.625-inch diameter or double strand of 0.0475-inch diameter wire.

2.09 DRY WALL CEILING SUSPENSION SYSTEM

- A. Use system of main runners, cross tees, and furring channels.
- B. Manufacturers:
  - 1. Armstrong World Industries, Inc.; Furring Systems/Drywall.
  - 2. Chicago Metallic Corporation.
  - 3. USG Interiors, Inc.; Drywall Suspension System.

2.10 SPRAY TEXTURE

- A. Manufacturers and Products:
  - 1. Nonaggregate Finish:
    - a. National Gypsum Company; ProForm Perfect Spray EM/HF.
    - b. United States Gypsum Co.; SHEETROCK Wall and Ceiling Spray Texture (unaggregated).

## **PART 3      EXECUTION**

### **3.01      EXAMINATION**

- A.    Inspect surfaces to receive gypsum board and related materials before beginning work and report to Engineer any defects in such work which will adversely affect the quality of work specified herein.

### **3.02      PREPARATION**

- A.    General: Provide, install, and maintain necessary scaffold, staging, trestles, planking, and temporary heating, lighting, and ventilation as necessary for duration of gypsum board work.
- B.    Protection: Protect work of other trades.
- C.    Coordination:
  - 1.    Coordinate work with that of other trades. Check Specifications and Drawings of other trades to determine parts of work requiring coordination.
  - 2.    Cut and repair gypsum board systems for installation of omitted work.
- D.    Surface Preparation: Repair defective surfaces prior to starting work. Prepare as specified for application of specific materials.

### **3.03      ERECTION OF SUSPENDED CEILING**

- A.    General:
  - 1.    Securely brace all ceiling areas against sway as required by code for seismic control.
  - 2.    Prevent runner and furring channels from contacting masonry walls.
  - 3.    Provide 1-1/2-inch channels around recessed lighting fixture openings to support fixtures.
- B.    Hangers:
  - 1.    Space not over 4 feet on center (OC) in direction of runners and within 6 inches of ends of runners.
  - 2.    Securely attach to structure above and provide for full saddle tie to main runner at indicated height.
  - 3.    Install additional hangers at ends of each suspension member and at light fixtures, 6 inches from vertical surfaces.
  - 4.    Do not splay wires more than 5 inches in a 4-foot vertical drop.

5. Provide four-way wire splays at 45 degrees from main runner to support structure for every 144 square feet of ceiling area to prevent sway.
6. Wrap wire minimum three times horizontally, turning ends upward.
7. Where hanger wires cannot be hung vertically from structure above because of ducts, pipes, cable trays, or other interferences, provide trapezes of steel channels (minimum 2-inch deep, 16-gauge cold-rolled carrying channels) hung on steel rods or 8-gauge wire from structural members above. Hang ceiling wires from trapezes or similar members supporting ducts or pipes. Do not hang directly from ducts or pipes.

C. Main Runner Channels:

1. Run main runner channels spaced not more than 4 feet OC, and 6 inches from parallel walls, at right angles to the length of joists.
2. Overlap splices in main runners 12 inches minimum, interlock flanges, and securely tie near each end of splice with double loops of tie wire.

D. Furring Channels:

1. Attach furring channels to main runners at right angles, space at 16 inches OC.
2. Securely saddle tie furring to the main runners at each crossing or equivalent clips or attachments.
3. Splices in Cross-Furring: Lap 8 inches minimum, interlock flanges, and securely tie near each end of splice with two loops of tie wire.

### 3.04 ERECTION OF DRY WALL CEILING SUSPENSION SYSTEM

A. Follow manufacturer's printed instructions.

B. Hangers:

1. Space not over 4 feet OC in direction of runners and within 6 inches of ends of runners.
2. Securely attach to structure above and provide for full saddle tie to main runner at indicated height.
3. Connections shall develop full strength of hanger wire.

C. Bracing:

1. Securely brace ceiling areas against sway.
2. Where required by code, install for seismic control.
3. Prevent runner and furring channels from contacting masonry walls.

D. Where ducts interfere with normal spacing of hangers and carrying channels, install additional hangers and channels to properly suspend ceiling.

### 3.05 ERECTION OF LIGHT-GAUGE NONSTRUCTURAL METAL FRAMING

A. Layout: Align partitions as shown on Drawings.

B. Tracks:

1. Attach metal runner tracks to floor slabs with suitable fasteners located 2 inches from each end and spaced not more than 24 inches OC.
2. Where partitions terminate at suspended or framed ceilings attach top tracks to suspended ceiling with toggle or molly bolts spaced 24 inches OC.
3. Where partitions terminate above suspended ceilings provide diagonal bracing from top of partitions to structure above. Bracing shall be 3-5/8-inch metal studs staggered at 48 inches OC.
4. Where partitions terminate at underside of concrete or metal decking attach deflection channels to substrate with suitable fasteners located 2 inches from each end and spaced not more than 24 inches OC. Locate partition top tracks within deflection channels with a minimum top clearance of 1 inch. Do not attach track to channel.

C. Studs:

1. ASTM C754.
2. Following manufacturer's printed instructions, position studs vertically, engaging floor and ceiling tracks and spaced as noted on Drawings.
3. Splice: When necessary, use 8-inch nested lap and one positive attachment per stud flange.
4. Place in direct contact with doorframe jambs, abutting partitions, and partition corners. Provide for anchorage of doorframes to studs.
5. Anchor studs for shelf-walls and those adjacent to window and doorframes, partition intersections, and corners to ceiling and floor runner flanges. Securely anchor studs to jamb and head anchor clips of door or borrowed-light frames by bolt or screw attachment.
6. Over metal door and borrowed-light frames, place horizontally a cut-to-length section of runner, with a web-flanged bend at each end, and secure with one positive attachment per flange. Position a cut-to-length stud (extending to ceiling runner) at vertical panel joints over doorframe header.
7. Locate studs at abutting construction, partition intersections, and partition corners.
8. Spacing: At 16 inches OC, unless otherwise required by manufacturer.

9. At Doorframes and Cased Openings:
  - a. Full height double studs, No. 20 gauge minimum, secured to jamb anchors by bolts, screws, or welds.
  - b. Header Track: Secure to frame head anchors and double studs.
  - c. Provide double channel stiffeners through studs above frame and extend at least one stud space beyond each jamb.
10. Windows: Similar framing to door openings with stiffeners both above and below.
11. Wall Mounting Accessories: Provide channels, horizontal studding, No. 16 gauge sheet 8 inches by 2 inches greater than stud spacing, or other members within walls as required to provide secure and adequate support.

D. Furring:

1. Space furring channels the same as studs or as shown.
2. Around columns and beams construct furring as shown using metal studs and furring channels securely tied together and anchored in-place.
3. Attach resilient furring channels to wood framing with screws.

### 3.06 APPLICATION OF GYPSUM BOARD

A. Inspection and Preparation:

1. Check framing for accurate spacing and alignment.
2. Verify spacing of installed framing does not exceed maximum allowable for thickness of gypsum board to be used.
3. Verify frames are set for thickness of gypsum board to be used.
4. Do not proceed with installation of gypsum board until deficiencies are corrected and surfaces to receive gypsum board are acceptable.
5. Repair protrusions of framing, twisted framing members, or unaligned members before installation of gypsum board is started.

B. General:

1. Meet requirements of ASTM C840 and GA 216.
2. Joints: Use gypsum board of maximum lengths to minimize end joints. Stagger end joints when they occur. Locate end joints as far as possible from center of wall or ceiling. Abut gypsum board without forcing. Neatly fit ends and edges of gypsum board. Do not place butt ends against tapered edges.
3. Support ends and edges of gypsum board panels on framing or furring members except for face layer of double layer and where ends are back blocked and floated.

4. Use metal edge trim where gypsum board abuts another material, at corners, and where shown or noted on Drawings.
5. Use cementitious backer board in toilet, shower, and janitor room walls behind ceramic tile and elsewhere as indicated on Drawings.
6. Follow manufacturer's recommendation of good practice.

C. Over Framing:

1. Apply gypsum board first to ceiling and then to walls for single layer horizontal application.
2. Use vertical application for fire-rated walls.
3. Fasten gypsum board securely to framing using double nailing, screw, or adhesive method.

D. Sound-Rated Partitions:

1. Fabricate and erect in accordance with manufacturer's printed instructions for required rating.
2. Install sound-deadening board and attenuation blankets as detailed.
3. Seal with acoustical sealant perimeter edges of gypsum board, joints around penetrations, and other joints as noted.

3.07 INSTALLATION OF CEMENTITIOUS BACKER BOARD (CBB)

- A. Follow manufacturer's printed instructions for erection, cutting, attachments, and joint treatment.
- B. Verify framing is installed at maximum 16 inches OC, and necessary blocking to support fixtures and accessories has been installed. Where backing plates or straps are used, space out from framing to ensure a smooth finish application. Do not proceed until defects are corrected and are acceptable.
- C. Precut boards to required sizes and make necessary cutouts. Fasten with appropriate fasteners. Space fasteners 6 inches OC maximum or as directed by manufacturer. Fit ends closely but not forced together. Maintain 1/4-inch spacing between edge of board and fixture. Caulk all joints and corners that are to receive tiles. Apply 2-inch glass fiber tape over joints and corners embedded with tile setting mortar.

3.08 JOINT SYSTEM FOR GYPSUM WALLBOARD

- A. Interior Gypsum Board: Conform to ASTM C840.
- B. Required: On exposed gypsum board, under ceramic tile and wall covering, and behind casework.

- C. Prefill: Fill V-grooves formed by abutting rounded edges of gypsum board with prefill joint compound. Fill V-joint flush and remove excess compound beyond groove. Leave clear depression to receive tape. Permit prefill joint compound to harden prior to application of tape.
- D. Taping and Finishing Joints:
1. Taping or Embedding Coat: Apply compound in thin, uniform layer to joints and angles to be reinforced. Apply reinforcing tape immediately. Center tape over joint and seat tape into compound. Leave approximately 1/64-inch to 1/32-inch compound under tape to provide bond. Apply skim coat immediately following tape embedment but not to function as fill or second coat. Fold tape and embed in angles to provide true angle. Dry embedding coat prior to application of fill coat.
  2. Filling Coat: Apply joint compound over embedding coat. Fill taper flush with surface. Apply fill coat to cover tape. Feather out fill coat beyond tape and previous joint compound line. For joints with no taper, feather out at least 4 inches on either side of tape. Do not apply fill coat on interior angles. Allow fill coat to dry prior to application of finish coat.
  3. Finishing Coat: Spread joint compound evenly over and beyond fill coat on joints. Feather to smooth uniform finish. Apply finish coat to taped angles to cover tape and taping compound. Sand final application of compound to provide surface ready for decoration.
  4. Filling and Finishing Depressions: Apply joint compound as first coat to fastener depressions. Apply at least two additional coats of compound after first coat is dry. Leave filled and finished depressions level with plane of surface.
- E. Finishing Beads and Trim:
1. First Fill Coat: Apply joint compound to bead and trim. Feather out from ground to plane of the surface. Dry compound prior to application of second fill coat.
  2. Second Fill Coat: Apply joint compound in same manner as first fill coat. Extend beyond first coat onto face of gypsum board. Dry compound prior to application of finish coat.
  3. Finish Coat: Apply joint compound to bead and trim. Extend beyond second fill coat. Feather finish coat from ground to plane of surface. Sand finish coat to provide flat surface ready for decoration.



### 3.09 FINAL FINISHES FOR GYPSUM WALLBOARD

- A. Levels of Finish: Conform to GA 214.
- B. Level 1:
  - 1. Taping or embedding coat only.
  - 2. Use in concealed areas, and where indicated, unless a higher level is required for fire-resistive or sound-rated assemblies.
- C. Level 2:
  - 1. Taping, filling, and finishing coats.
  - 2. Use on water-resistant gypsum backing board.
- D. Level 3:
  - 1. Taping, filling, and finishing coats.
  - 2. Use on surfaces indicated to have spray texture or ceramic tile.
- E. Level 4:
  - 1. Taping, filling, and finishing coats plus two separate coats applied over joints, angles, fastener heads, and trim accessories.
  - 2. Sand between coats and after last coat.
  - 3. Use on surfaces indicated to receive wall coverings.
- F. Level 5:
  - 1. Same as Level 4, plus a thin, smooth, uniform skim coat of joint compound, or product specially formulated for this purpose, over entire surface.
  - 2. Produce surfaces free of tool marks and ridges, ready for decoration.
  - 3. Use on surfaces not indicated otherwise, those indicated to receive gloss, semi-gloss, and nontextured flat paints, and where indicated.

### 3.10 SPRAY TEXTURE

- A. Application:
  - 1. Apply on gypsum board wall following manufacturer's printed directions for a medium build peel texture.
  - 2. Before texture application, finish gypsum board as specified for Level 3.
  - 3. When surfaces are prepared and dry, apply sealer and allow to dry. Mix texture finish material as directed by manufacturer.
  - 4. Use spray equipment of a size and type to assure acceptable results.

5. Apply by spray only at a coverage rate as recommended by manufacturer and in accordance with directions printed on container. Apply material to blend uniformly and cover fully without starved spots or other evidence of thin application. Provide uniform texture without application patterns.
6. After spray application, knockdown and flatten high spots with trowel to produce a Brocade or Travertine marble texture.

### 3.11 ADJUST AND CLEAN

- A. Clean: Remove droppings or texture overspray from walls, windows, and floor, leaving room clean for following trades.
- B. Nail Pop: Repair nail pop by driving new nail approximately 1-1/2 inches from nail pop and reseal nail. When face paper is punctured, drive new nail or screw approximately 1-1/2 inches from defective fastening and remove defective fastening. Fill damaged surface with compound.
- C. Ridging:
  1. Do not repair ridging until condition has fully developed, approximately 6 months after installation or one heating season.
    - a. Sand ridges to reinforcing tape without cutting through tape.
    - b. Fill concave areas on both sides of ridge with topping compound.
    - c. After fill is dry, blend in topping compound over repaired area.
  2. Fill cracks with compound and finish smooth and flush.

### END OF SECTION

**SECTION 09 30 00  
TILING**

**PART 1      GENERAL**

**1.01      REFERENCES**

A.    The following is a list of standards which may be referenced in this section:

1.    American National Standards Institute (ANSI):
  - a.    A108.1A, Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar.
  - b.    A108.1B, Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar.
  - c.    A108.1C, Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar.
  - d.    A108.4, Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive.
  - e.    A108.5, Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
  - f.    A108.6, Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy.
  - g.    A108.8, Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout.
  - h.    A108.9, Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout.
  - i.    A108.10, Installation of Grout in Tilework.
  - j.    A108.11, Interior Installation of Cementitious Backer Units.
  - k.    A118.1, Dry-Set Portland Cement Mortar.
  - l.    A118.3, Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy and Water-Cleanable Tile-Setting and Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.
  - m.    A118.4, Latex-Portland Cement Mortar.
  - n.    A118.5, Chemical Resistant Furan Mortars and Grouts for Tile Installation.
  - o.    A118.6, Standard Cement Grouts for Tile Installation.
  - p.    A118.10, Load Bearing, Bonded, Waterproof Membranes for Thin-set Ceramic Tile and Dimension Stone Installation.
  - q.    A136.1, Organic Adhesives for Installation of Ceramic Tile.
  - r.    A137.1, Ceramic Tile.

2. ASTM International (ASTM):
  - a. A497/497M, Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete.
  - b. C144, Standard Specification for Aggregate for Masonry Mortar.
  - c. C150, Standard Specification for Portland Cement.
  - d. C206, Standard Specification for Finishing Hydrated Lime.
  - e. C207, Standard Specification for Hydrated Lime for Masonry Purposes.
  - f. C267, Standard Test Method for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.
  - g. C395, Standard Specification for Chemical-Resistant Resin Mortars.
  - h. C847, Standard Specification for Metal Lath.
  - i. C920, Standard Specification for Elastomeric Joint Sealants.
  - j. D226, Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
3. South Coast Air Quality Management District: SCAQMD Rule 1168 – Adhesive and Sealant Applications.
4. Tile Council of North America (TCA): Handbook for Ceramic Tile Installation.

## 1.02 SUBMITTALS

### A. Action Submittals:

1. Samples:
  - a. Two for each color, pattern, and type of tile specified.
  - b. Mark Samples clearly to indicate color or shade, location in which to be used, and manufacturer's name.

### B. Informational Submittals:

1. Certification of Compliance: For tile, mortar, grouts, and adhesives.
2. Manufacturer's Instructions: For storage, mixing, application, cleanup, and use of proposed mortars, grouts, and adhesives.
3. Tile Manufacturer's Maintenance Guidelines: For Owner's use in maintaining ceramic tilework specified herein.

## 1.03 QUALITY ASSURANCE

- A. Perform Work in accordance with TCA Handbook and ANSI A108 Series/A118 Series.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Set and grout tile in portland cement mortar when ambient temperature is at least 50 degrees F and rising. Follow ANSI A108.1A or ANSI A108.1B, as recommended by ANSI A108.1C.
- B. Comply with minimum temperature recommendations of manufacturers for bonding and grouting materials other than portland cement mortar.

1.05 EXTRA MATERIALS

- A. Tile: Furnish extra 2 percent of each tile used in clean, marked cartons for Owner's future use.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

- A. Materials and products specified in this section shall be products of:
  - 1. American Olean Tile Co.
  - 2. Dal-Tile Corp.
  - 3. United States Ceramic Tile Co.

2.02 MATERIALS

- A. Unglazed Ceramic Floor Tile: ANSI A137.1, Section 5.1, porcelain type, smooth cushion edge, nominal face size 6 inches by 6 inches. Furnish slip-resistant tile with 7-1/2 percent abrasive grain content in all areas where floor tile is scheduled or shown on the Drawings.
- B. Glazed Wall Tile:
  - 1. ANSI A137.1, Section 6.1.
  - 2. Cushion edges, face finished with colored bright glaze, nominal face size 6 inches by 6 inches.
- C. Trim Shapes and Bases: Type, color, and finish to match wall tiles.
- D. Latex-Portland Cement Mortar: ANSI A118.4.
- E. Latex-Portland Cement Grout: Portland cement grout with latex additive, commercial quality, ANSI A118.6.

## 2.03 ANCILLARY MATERIALS

- A. Edge Strips: Stainless steel, Alloy 316 flat bar, 1/8 inch by depth of tile and mortar.
- B. Shower Pan: Membrane that meets the requirements of local authority having jurisdiction or governing building code.
- C. Shower Wall Membrane: ANSI A118.10; composite, sheet membrane made from PVC with non-woven fiber laminated to both sides. Manufacturer and Product: Noble Co.; Wall Seal.
- D. Tile Cleaner: Neutral tile cleaner solution acceptable to tile manufacturer.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Examine surfaces to receive ceramic tile, setting beds, or accessories prior to tile installation.
- B. Correct defects or adverse conditions affecting quality and execution of tile installation.
- C. Surfaces to receive tile shall be plumb, level, and true with square corners.
- D. Tolerances for Surfaces to Receive Tile:
  - 1. Portland Cement and Epoxy Mortar Methods:
    - a. Maximum Variation in Subfloor Surface: 1/4 inch in 10 feet.
    - b. Maximum Variation in Vertical and Ceiling Surfaces: 1/4 inch in 8 feet.
- E. Grounds, anchors, plugs, hangers, bucks, electrical and mechanical work, in or behind tile, to be installed prior to proceeding with tilework.
- F. Protection: Protect adjoining work surfaces before tilework begins.
- G. Make substrate firm, dry, clean, and free of oily or waxy films.

### 3.02 INSTALLATION

- A. Prepare surfaces, fit, set, or bond tile, grout and clean tile in accordance with applicable requirements of ANSI Standards for setting method specified, except as otherwise noted.

- B. Workmanship, Cutting, Fitting, and Grout Joint Size:
1. Center and balance areas of tile.
  2. Generally start full size tiles at outside corners and leave cut tiles for inside corners.
  3. Tile Cutting:
    - a. Minimize number of cuts.
    - b. No cuts smaller than half size without approval of Engineer.
    - c. Make all cuts on the outer edges of the field.
    - d. Smooth cut edges. Install tile without jagged or flaked edges.
    - e. Do not split tile unless no other alternative is possible.
  4. Fit tile closely where edges will be covered by trim, escutcheons, or other similar devices.
  5. Maintain heights of tile work in full courses to nearest obtainable dimension where heights are given in feet and inches and are not required to fill vertical spaces exactly.
  6. Allowable Lippage: 1/32 inch.
  7. Grout Joint Size: 1/8 inch.
  8. Install accessories in tile work to be evenly spaced, properly centered with tile joints, and level, plumb, and true to the correct projection. Install accessories at locations and heights shown or designated.
- C. Trim: Provide bases, caps, stops, returns, trimmers, and other shapes to finish installation.
- D. Setting Wall Tile (Thin-Set Application):
1. On Cementitious Backer Board Walls: Meet TCA Method W244C.
  2. Use latex-portland cement grout.
- E. Setting Floor Tile (Thin-Set Application):
1. On Concrete: Meet TCA Method F113 with latex-portland cement grout.
- F. Edge Strips:
1. At openings without thresholds and similar discontinuous edges of thin-set tile floors.
  2. Where ceramic tile floors are adjacent to other flooring material at same level.
  3. Where ceramic tile cove base is combined with other types of flooring.

### 3.03 CLEANING AND SEALING

- A. Clean tile surfaces thoroughly on completion of grouting.
- B. Remove grout haze, observing tile manufacturer's recommendations as to use of acid and chemical cleaners.
- C. Rinse tilework thoroughly with clean water before and after using chemical cleaners.
- D. Polish surface of glazed tilework with soft cloth.
- E. After grout has cured for 10 days, clean and seal nonglazed tiles following sealer manufacturer's instructions and recommendations.

### 3.04 PROTECTION

- A. From Construction Dirt:
  - 1. Apply protective coat of neutral cleaner solution, one part cleaner to one part water, to clean completed tile walls and floors.
  - 2. Cover tile floors with heavy-duty, nonstaining construction paper, masked in-place.
  - 3. Just before substantial completion, remove paper and rinse protective coat of neutral cleaner from tile surfaces.
- B. From Traffic:
  - 1. Prohibit foot and wheel traffic from using newly tiled floors for at least 7 days.
  - 2. Place large, flat boards in walkways and wheel ways for 7 days where use of newly tiled floor with cement type grout is unavoidable.

**END OF SECTION**



**SECTION 09 51 23**  
**ACOUSTICAL TILE CEILINGS**

**PART 1 GENERAL**

**1.01 REFERENCES**

- A. The following is a list of standards that may be referenced in this section:
1. ASTM International (ASTM):
    - a. A641/A641M, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
    - b. C635/C635M, Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
    - c. C636/C636M, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
    - d. E1264, Standard Classification for Acoustical Ceiling Products.
  2. Underwriters Laboratories Inc. (UL): Fire Resistance.

**1.02 SUBMITTALS**

- A. Action Submittals:
1. Shop Drawings:
    - a. Detailed layout of grid indicating hanger spacing, fastening and splicing details, change in level details, and access location.
    - b. Anchorage and bracing drawings and/or catalog information, as required by Section 01 88 15, Anchorage and Bracing, for loads shown on General Structural Notes on Drawings.
  2. Samples:
    - a. One 12-inch square of each acoustical unit material to illustrate range of appearance.
    - b. One full-size Sample of each suspension system member and molding.
    - c. Mark with name of manufacturer and specific design and technical data.
- B. Informational Submittals:
1. Anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing, for loads shown on General Structural Notes on Drawings.
  2. Manufacturer's recommendation for installation of system.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials with manufacturer's labels indicating brand name, pattern, size, thickness, and fire rating.
- B. Store materials in original protective packaging to prevent soiling, physical damage, or wetting.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Where acoustical materials are to be installed, maintain humidity of 65 percent to 75 percent in area for 25 hours before, during, and 25 hours after installation.
- B. Maintain a uniform temperature of 55 degrees F to 70 degrees F during installation of materials.

1.05 EXTRA MATERIAL

- A. Provide acoustical units from same production run as installed equal to 1 percent of area.

**PART 2 PRODUCTS**

2.01 SUSPENSION SYSTEMS

- A. Components, Materials, and Accessories: Product of a single manufacturer.
- B. ASTM C635/C635M, Intermediate Duty:
  - 1. Exposed Tee Grid: Fire-rated spaced to fit lay-in panels.
    - a. Manufacturers and Products:
      - 1) Chicago Metallic Corp.; Fire Front 1230 System.
      - 2) Donn Corp.; Donn DXL fire-rated grid.
  - 2. Main and Cross Members:
    - a. Double web design, cold-rolled steel, minimum thickness of 0.020 inch, electrozinc-coated and factory-painted low-sheen satin white finish.
    - b. Exposed Flange Width: 15/16 inch.
  - 3. Edge Molding:
    - a. Minimum 0.020-inch steel, channel- or angle-shaped.
    - b. Flange Width: 15/16 inch, minimum.
    - c. Finish to match main members.

4. Hanger Wire: ASTM A641/A641M, minimum 12-gauge, galvanized, soft-annealed, mild steel wire.
5. Wire Ties: ASTM A641/A641M, 18-gauge, galvanized, annealed steel wire.

## 2.02 ACOUSTICAL UNITS

### A. Flat Lay-In Panels:

1. Material: Fire-resistive mineral fiber, Class A.
2. In accordance with ASTM E1264, Type III, Form 2.
3. Pattern: Random fissured.
4. Noise Reduction Coefficient (NRC): 0.55 to 0.65.
5. Ceiling Attenuation Class (CAC): 35 minimum.
6. Light Reflectance: LR 0.75 or over.
7. Nominal Size: 24 inches by 24 inches by 5/8-inch thick.
8. Edges: Square.
9. Finish and Color: Painted white, unless scheduled otherwise.
10. Manufacturers and Products:
  - a. Armstrong; Item 895, Minaboard, Cortega.
  - b. Celotex; Item PBT-197, Hytone, Baroque.
  - c. U.S.G.; Item 56705, Auratone, Natural Fissured II.

## PART 3 EXECUTION

### 3.01 SEQUENCING

- A. Lay out grid.
- B. Coordinate with mechanical and electrical equipment in framing and cutting material around ceiling penetrations.
- C. Install suspension systems after mechanical work above is complete.
- D. Install acoustical units.

### 3.02 INSTALLATION OF SUSPENDED GRID SYSTEM

- A. Hang level and in straight alignment directly from structure following ASTM C636/C636M and manufacturer's current printed instructions.

B. Hanger Wires:

1. Space maximum 4 feet on center each direction and securely attach to structure above.
2. Install additional hangers at ends of each suspension member and at light fixtures, 6 inches from vertical surfaces.
3. Do not splay wires more than 5 inches in a 4-foot vertical drop.
4. Provide four-way wire splays at 45 degrees from main runner to support structure for every 144 square feet of ceiling area.
5. Wrap wire minimum three times horizontally, turning ends upward.
6. Where hanger wires cannot be hung vertically from structure above because of ducts, pipes, cable trays, or other interferences, provide steel channel trapezes (minimum 2-inch deep, 16-gauge cold-rolled carrying channels) hung on steel rods or 8-gauge wire from structural members above. Hang ceiling wires from these trapezes or similar members supporting ducts or pipes. Do not hang directly from ducts or pipes.
7. Follow suspension system manufacturer's instructions for modified installation required for Seismic Design Category indicated in General Structural Notes on Drawings.

C. Edge Molding:

1. Install at intersection of suspended ceiling and vertical surfaces.
2. Miter corners where moldings intersect or install corner caps.
3. Attach to vertical surface with mechanical fasteners.

- D. Provide additional channels, hangers, and trapezes as required to support edges of ceiling around and under mechanical and electrical work.

3.03 INSTALLATION OF ACOUSTICAL UNITS

- A. Upon completion of suspended grid system and other concealed work, install with pattern running in one direction.
- B. Place material to bear all around on suspension members.

3.04 CLEANING

- A. Clean soiled or discolored unit surfaces after installation.
- B. Touch up scratches, abrasions, voids, and other defects in painted surfaces.

3.05 SCHEDULE OF CEILING TYPES

- A. Areas to Receive Acoustical Ceilings: As indicated on Interior Finish Schedule located on Drawings.

**END OF SECTION**



**SECTION 09 65 00  
RESILIENT FLOORING**

**PART 1      GENERAL**

**1.01      REFERENCES**

A.    The following is a list of standards which may be referenced in this section:

1.    ASTM International (ASTM):
  - a.    D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
  - b.    D570, Standard Test Method for Water Absorption of Plastics.
  - c.    D2047, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
  - d.    E595, Standard Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment.
  - e.    E648, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.
  - f.    E662, Test Method for Specific Density of Smoke Generated by Solid Materials.
  - g.    F970, Test Method for Static Load Limit.
  - h.    F1066, Standard Specification for Vinyl Composition Floor Tile.
  - i.    F1303, Standard Specification for Sheet Vinyl Floor Covering with Backing.
  - j.    F1344, Standard Specification for Rubber Floor Tile.
  - k.    F1515, Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change.
  - l.    F1700, Standard Specification for Solid Vinyl Floor Tile.
  - m.    F1859, Standard Specification for Rubber Sheet Floor Covering without Backing.
  - n.    F1861, Standard Specification for Resilient Wall Base.
  - o.    F2034, Standard Specification for Sheet Linoleum Floor Covering.
  - p.    F2195, Standard Specification for Linoleum Floor Tile.
  - q.    G21, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
2.    National Fire Protection Association (NFPA):
  - a.    253, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.
  - b.    258, Test Method for Specific Density of Smoke Generated by Solid Materials.

## 1.02 SUBMITTALS

### A. Action Submittals:

#### 1. Samples:

- a. Two full-size tiles for each type and color or pattern of resilient flooring.
- b. Two 2-1/2-inch-wide strips of base material proposed for use.
- c. Two 6-inch-long strips of trim materials.

### B. Informational Submittals:

1. Manufacturer's certificate of compliance.
2. Operation and Maintenance Data:
  - a. As specified in Section 01 78 23, Operation and Maintenance Data.
  - b. List of recommended maintenance products, methods, and procedures.

## 1.03 DELIVERY, STORAGE, AND HANDLING

- ### A.
- Store materials in original containers at not less than 70 degrees F ambient temperature for not less than 24 hours immediately before installation.

## 1.04 ENVIRONMENTAL REQUIREMENTS

- ### A.
- Maintain ambient temperature in space to receive flooring between 70 degrees F and 90 degrees F for not less than 24 hours before and 48 hours after installation.
- ### B.
- Maintain minimum temperature of 55 degrees F after flooring is installed, except as specified above.

## 1.05 EXTRA MATERIALS

- ### A.
- Furnish additional floor covering materials from same production run as installed material at the rate of 45 square feet for each 1,000 square feet.

## 1.06 SEQUENCING AND SCHEDULING

- ### A.
- Do not install floor coverings until concrete slab has cured for 60 days or until primer material in test patches cannot be scraped or peeled from the slab after drying 24 hours.



## **PART 2      PRODUCTS**

### **2.01      MANUFACTURERS**

- A.    Flooring products of the following manufacturers, meeting these Specifications, may be used on this Project:

1.    Afco Rubber Corp. (nosings, treads, and transitions).
2.    Armstrong World Industries, Inc.
3.    Azrock Floor Products.
4.    Burke Flooring Products.
5.    Tarkett/Johnsonite.
6.    Mannington Commercial.
7.    Roppe (base).

### **2.02      FLOOR COVERING MATERIALS**

- A.    General: Furnish materials uniform in thickness and size with edges cut accurately and square; uniform color with variations in variegated patterns kept to a minimum.

- B.    Vinyl Composition Tile (VCT):

1.    ASTM F1066, Class 2, through pattern tile.
2.    Size: 12 inches by 12 inches by 1/8 inch thick.
3.    Manufacturers and Products:
  - a.    Armstrong; Match Azrock VCT as indicated in the Color list schedule shown on the Drawings.
  - b.    Azrock; Match Azrock VCT as indicated in the Color list schedule shown on the Drawings.

### **2.03      RUBBER BASE**

- A.    General: ASTM F1861, uniform in 0.125-inch thickness and in as long lengths as practicable to suit conditions of installation.

1.    Factory premolded internal and external corners to match base when available.
2.    Style: B, cove.
3.    4 inches high.

- B.    Manufacturers and Products:

1.    Armstrong; Color-Integrated Wall Base.
2.    Johnsonite; Traditional Wall Base.

## 2.04 ACCESSORIES

- A. Trim: Furnish in lengths as long as practical to suit conditions of installation.
- B. Reducers:
  - 1. Standard rubber or vinyl floor reducer in thickness to suit abutting floor covering by 1-inch wide, tapered or beveled-edge strip.
  - 2. Manufacturers and Products:
    - a. Johnsonite; Reducer Series RRS.
    - b. Mercer; 633 Tile Reducer.
- C. Adhesive: Type and brands of adhesive as recommended by manufacturer of floor covering material for conditions of installation.
- D. Primer and Crack Filler: Type and brand recommended by floor covering manufacturer.
- E. Floor Filler:
  - 1. Asphalt mastic as manufactured by:
    - a. Armstrong, Lancaster, PA.
    - b. Or equal.
- F. Concrete underlayment as manufactured by:
  - 1. Ardex Inc., Coraopolis, PA; Ardex K-55.
  - 2. Or equal.

## **PART 3 EXECUTION**

### 3.01 EXAMINATION

- A. Examine substrate for excessive moisture content and unevenness preventing execution and quality of resilient flooring as specified.
- B. Correct defects before installation of resilient flooring.

### 3.02 PREPARATION

- A. Remove dirt, oil, grease, or other foreign matter from surfaces to receive floor covering materials.
- B. Fill cracks less than 1/16-inch wide and depression less than 1/8-inch deep with floor filler.
- C. Prime surfaces, other than wood, if recommended by floor covering manufacturer.

### 3.03 APPLICATION OF ADHESIVES

- A. Mix and apply adhesives in accordance with manufacturer's instructions.
- B. Provide safety precautions during mixing and applications as recommended by adhesive manufacturer.
- C. Apply uniformly over surfaces:
  - 1. Cover only amount of area that can be covered by flooring material within recommended working time of adhesive.
  - 2. Remove any adhesive that dries or films over.
  - 3. Do not soil walls, bases, or adjacent areas with adhesives.
  - 4. Promptly remove any spillage.
- D. Apply adhesives with notched trowel or other suitable tool.
- E. Clean trowel and rework notches as necessary to ensure proper application of adhesive.

### 3.04 INSTALLATION OF TILE MATERIALS

- A. Start tile at center of room or space; work toward perimeter.
- B. Do not lay tile less than half the width of a field tile except where accepted by Engineer for irregularly shaped rooms or spaces.
- C. Cut border tile neatly and accurately to fit within 1/64 inch of abutting surfaces.
- D. Use reducer edge strip at exposed tile edges.
- E. Fit flooring material neatly and tightly into breaks and recesses, against bases, around pipes and penetrations, under saddles or thresholds, and around permanent cabinets and equipment.
- F. Lay tile parallel to room axis in straight courses with cross joints parallel. Lay tile with grain or pattern running in opposite direction between adjacent tile.
- G. Roll flooring with 75-pound to 100-pound roller in both directions.

### 3.05 INSTALLATION OF BASE

- A. General: Remove defects in wall and floor that would prevent level and true installation of base material.
  - 1. Install base around perimeter of room or space, where shown, and at toe spaces of casework and cabinets.
  - 2. Unroll base material and cut into accurate lengths as desired or as required for minimum number of joints.
  - 3. Match edges at seams or double cut adjoining lengths to give continuous appearance.
  - 4. Install with tight butt joints with no joint widths greater than 1/64 inch.
- B. Top-Set Base:
  - 1. Apply adhesive and firmly adhere to wall surfaces.
  - 2. Press down so bottom cove edge follows floor profile.
  - 3. Ensure top and bottom edges of base are in firm contact with walls and floors.
  - 4. Form internal and external corners by using premolded corners. Other methods, acceptable to Engineer, may be used if premolded corners are not available.
  - 5. Scribe base accurately to abutting materials.

### 3.06 INSTALLATION OF TRIM MATERIALS

- A. Provide reducers where floor covering terminates exposing edge of covering.
- B. Center reducer under door, where floor covering terminates at a door opening. Fit end edges to door frames and abutting surfaces and other edges to adjoining materials.
- C. Apply adhesives and bond securely to substrates in straight true lines. Meet visible and related features of building construction with a maximum deviation of 1/8 inch in 10 feet.

### 3.07 CLEANING AND PROTECTION

- A. Upon completion of the installation of floor covering and adjacent work, and after materials have set, clean surfaces with a neutral cleaner as recommended by manufacturer for type of floor covering material installed.
- B. Repair adjacent surfaces damaged by flooring installation.

- C. Wax Finishing: Apply one coat of nonslip wax or other finish as recommended by floor covering manufacturer; buff to a sheen.
- D. Protect completed work from traffic and damage until Substantial Completion by covering with plastic sheet, kraft paper, or plywood panels.

3.08 INSTALLATION SCHEDULE

- A. Areas to receive resilient flooring, and pattern, are indicated in Interior Finish Schedule on Drawings.

**END OF SECTION**



**SECTION 09 67 00  
FLUID-APPLIED FLOORING**

**PART 1 GENERAL**

**1.01 SUBMITTALS**

- A. Action Submittals:
  - 1. Manufacturer's product specifications.
  - 2. Samples: Two 6-inch square Samples of color and finish selected.
- B. Informational Submittals:
  - 1. Evidence of installer's approval by manufacturer.
  - 2. Manufacturer's installation instructions.

**1.02 QUALITY ASSURANCE**

- A. Qualifications of Installer:
  - 1. Minimum of 5 years' experience in installing seamless flooring of similar size and materials.
  - 2. Approved by manufacturer of the flooring products.

**1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in their original, unopened containers, clearly labeled with manufacturer's name, brand name, and such identifying numbers as are appropriate.
- B. Store materials at temperatures between 60 degrees F and 80 degrees F. Should they be exposed to lower temperatures, restore to 60 degrees F prior to use.
- C. Protect materials against wetting, moisture absorption, and construction traffic.

**1.04 EXTRA MATERIALS**

- A. Provide minimum 2 gallons of unopened top coating material for future use by Owner.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Materials, equipment, and accessories specified in this section shall be products of:
  - 1. Crossfields Products Corp.; Dex-O-Tex DecorFlor.
  - 2. Dur-A-Flex, Inc.; Dur-A-Quartz.
  - 3. Florock; Floroquartz IV.
  - 4. Stonhard; Stonshield SLT.
  - 5. Selby, Battersby & Co.; Selbatwede 71.

### **2.02 MATERIALS**

- A. Floor Covering and Cove Base Epoxy: 100 percent solids, thermosetting epoxy resins reacted with suitable hardeners to produce a seamless, monolithic, plastic coating.
- B. Aggregate: Quartz (silicon dioxide) base rock granules fired with a colored ceramic coating as manufactured by:
  - 1. 3M; Colorquartz Brand.
  - 2. Stonhard, Inc.
- C. Edge or Divider Strips: Standard products manufactured or approved by floor covering manufacturer for use with seamless covering material used.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verification of Conditions: Examine surfaces scheduled to receive seamless covering for all defects, dampness, paint, or foreign material that would affect the quality and execution of the Work.
- B. Perform moisture or adhesion tests as recommended by manufacturer.
- C. Make corrections necessary to provide surfaces acceptable to manufacturer.

### **3.02 PREPARATION**

- A. Clean concrete surfaces of foreign material, sealers, hardeners, waxes and other curing compounds, laitance, and grease.



- B. Prepare concrete by mechanical means, including use of a scabbler, scarifier, or shot blast machine, for removal of bond inhibiting materials, such as curing compounds and laitance. Acid etching is not an acceptable method of preparation.
- C. Apply primer to surfaces as required by flooring material manufacturer.

3.03 INSTALLATION

- A. Install seamless floor covering following manufacturer's instructions and recommendations.
- B. Apply to floor and base in minimum thickness permitted by aggregate, approximately 3/32 inch.
- C. Finish glossy and slip resistant.
- D. Install at locations indicated in Interior Finish Schedule on Drawings.

3.04 PROTECTION

- A. During installation, protect adjacent surfaces against damage.
- B. After installation, allow no traffic on seamless finish for 48 hours or until completely cured.
- C. Keep water off floor for at least 5 days.
- D. Do not cover with paper until it will not stick. Use only nonstaining paper.

**END OF SECTION**



**SECTION 09 90 00  
PAINTING AND COATING**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    American Water Works Association (AWWA):
    - a.    C203, Coal-Tar Protective Coatings and Linings for Steel Water Pipelines—Enamel and Tape—Hot-Applied.
    - b.    C209, Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
    - c.    C213, Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
    - d.    C214, Tape Coating Systems for the Exterior of Steel Water Pipelines.
  2.    Environmental Protection Agency (EPA).
  3.    NACE International (NACE): SP0188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
  4.    NSF International (NSF): 61, Drinking Water System Components - Health Effects.
  5.    Occupational Safety and Health Act (OSHA).
  6.    Research Council on Structural Connections (RCSC): Specification for Structural Joints using High-Strength Bolts.
  7.    The Society for Protective Coatings (SSPC):
    - a.    PA 2, Procedure for Determining Conformance to Dry Coating Thickness Requirements.
    - b.    PA 10, Guide to Safety and Health Requirements for Industrial Painting Projects.
    - c.    SP 1, Solvent Cleaning.
    - d.    SP 2, Hand Tool Cleaning.
    - e.    SP 3, Power Tool Cleaning.
    - f.    SP 5, White Metal Blast Cleaning.
    - g.    SP 6, Commercial Blast Cleaning.
    - h.    SP 7, Joint Surface Preparation Standard Brush-Off Blast Cleaning.
    - i.    SP 10, Near-White Blast Cleaning.
    - j.    SP 11, Power Tool Cleaning to Bare Metal.
    - k.    SP 16, Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
    - l.    SP 13, Surface Preparation of Concrete.
    - m.    Guide 15, Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates.

## 1.02 DEFINITIONS

### A. Terms used in this section:

1. Coverage: Total minimum dry film thickness in mils or square feet per gallon.
2. FRP: Fiberglass Reinforced Plastic.
3. HCl: Hydrochloric Acid.
4. MDFT: Minimum Dry Film Thickness, mils.
5. MDFTPC: Minimum Dry Film Thickness per Coat, mils.
6. Mil: Thousandth of an inch.
7. PDS: Product Data Sheet.
8. PSDS: Paint System Data Sheet.
9. PVC: Polyvinyl Chloride.
10. SFPG: Square Feet per Gallon.
11. SFPGPC: Square Feet per Gallon per Coat.
12. SP: Surface Preparation.

## 1.03 SUBMITTALS

### A. Action Submittals:

1. Shop Drawings:
  - a. Data Sheets:
    - 1) For each product, furnish a Product Data Sheet (PDS), the manufacturer's technical data sheets, and paint colors available (where applicable). The PDS form is appended to the end of this section.
    - 2) For each paint system, furnish a Paint System Data Sheet (PSDS). The PSDS form is appended to the end of this section.
    - 3) Technical and performance information that demonstrates compliance with specification.
    - 4) Furnish copies of paint system submittals to the coating applicator.
    - 5) Indiscriminate submittal of only manufacturer's literature is not acceptable.
  - b. Detailed chemical and gradation analysis for each proposed abrasive material.

2. Samples:
  - a. Proposed Abrasive Materials: Minimum 5-pound sample for each type.
  - b. Reference Panel:
    - 1) Surface Preparation:
      - a) Prior to start of surface preparation, furnish a 4-inch by 4-inch steel panel for each grade of sandblast specified herein, prepared to specified requirements.
      - b) Provide panel representative of the steel used; prevent deterioration of surface quality.
      - c) Panel to be reference source for inspection upon approval by Engineer.
    - 2) Paint:
      - a) Unless otherwise specified, before painting work is started, prepare minimum 8-inch by 10-inch sample with type of paint and application specified on similar substrate to which paint is to be applied.
      - b) Furnish additional samples as required until colors, finishes, and textures are approved.
      - c) Approved samples to be the quality standard for final finishes.

B. Informational Submittals:

1. Applicator's Qualification: List of references substantiating experience.
2. Coating manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services.
3. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.
4. Manufacturer's written verification that submitted material is suitable for the intended use.
5. Coating for Faying Surfaces: Manufacturer's test results that show the proposed coating meets the slip resistance requirements of the AISC Specification for Structural Joints using ASTM A325 or ASTM A490 bolts.
6. If the manufacturer of finish coating differs from that of shop primer, provide finish coating manufacturer's written confirmation that materials are compatible.
7. Manufacturer's written instructions and special details for applying each type of paint.

#### 1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Minimum 5 years' experience in application of specified products.
- B. Regulatory Requirements:
  - 1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds.
  - 2. Perform surface preparation and painting in accordance with recommendations of the following:
    - a. Paint manufacturer's instructions.
    - b. SSPC PA 10.
    - c. Federal, state, and local agencies having jurisdiction.
- C. Mockup:
  - 1. Before proceeding with Work under this section, finish one complete space or item of each color scheme required showing selected colors, finish texture, materials, quality of work, and special details.
  - 2. After Engineer approval, sample spaces or items shall serve as a standard for similar work throughout the Project.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Shipping:
  - 1. Where precoated items are to be shipped to the Site, protect coating from damage. Batten coated items to prevent abrasion.
  - 2. Protect shop painted surfaces during shipment and handling by suitable provisions including padding, blocking, and use of canvas or nylon slings.
- B. Storage:
  - 1. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.
  - 2. Primed surfaces shall not be exposed to weather for more than 2 months before being topcoated, or less time if recommended by coating manufacturer.

1.06 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not apply paint in temperatures or moisture conditions outside of manufacturer's recommended maximum or minimum allowable.
2. Do not perform final abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air.

B. Status of Existing Coatings: The following information on existing coatings or substrate conditions is provided for information only, and is generally believed to be accurate, but is not guaranteed. Perform tests as required to verify applicability of this information to the Work.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

A. Nationally recognized manufacturers of paints and protective coatings who are regularly engaged in the production of such materials for essentially identical service conditions.

B. Minimum of 5 years' verifiable experience in manufacture of specified product.

C. Each of the following manufacturers is capable of supplying most of the products specified herein:

1. Protective Coating Systems:
  - a. Themec.
  - b. Carboline.
2. Architectural Paint Systems:
  - a. Sherwin Williams.
  - b. Benjamin Moore.

D. The same coatings manufacturer may be used for both systems.

2.02 ABRASIVE MATERIALS

A. Select abrasive type and size to produce surface profile that meets coating manufacturer's recommendations for specific primer and coating system to be applied.

## 2.03 PAINT MATERIALS

## A. General:

1. Manufacturer's highest quality products suitable for intended service.
2. Compatibility: Only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats.
3. Thinners, Cleaners, Driers, and Other Additives: As recommended by coating manufacturer.

## B. Products:

Product	Definition
Acrylic Latex	Single-component, finish as required
Acrylic Latex (Flat)	Flat latex
Acrylic Sealer	Clear acrylic
Alkyd (Semigloss)	Semigloss alkyd
Alkyd Enamel	Optimum quality, gloss or semigloss finish as required, medium long oil
Alkyd Wood Primer	Flat alkyd
Bituminous Paint	Single-component, coal-tar pitch based
Block Filler	Primer-sealer designed for rough masonry surfaces, 100% acrylic emulsion
Coal-Tar Epoxy	Amine, polyamide, or phenolic epoxy type 70% volume solids minimum, suitable for immersion service
DTM Acrylic Primer	Surface tolerant, direct-to-metal water borne acrylic primer
DTM Acrylic Finish	Surface tolerant, direct-to-metal water borne acrylic finish coat
Elastomeric Polyurethane	100% solids, plural component, spray applied, high build, elastomeric polyurethane coating, suitable for the intended service.
Epoxy Filler/Surfacer	100% solids epoxy trowel grade filler and surfacer, nonshrinking, suitable for application to concrete and masonry. Approved for potable water contact and conforming to NSF 61, where required.



<b>Product</b>	<b>Definition</b>
Epoxy Nonskid (Aggregated)	Polyamidoamine or amine converted epoxies aggregated; aggregate may be packaged separately
Epoxy Primer—Ferrous Metal	Anticorrosive, converted epoxy primer containing rust-inhibitive pigments
Epoxy Primer—Other	Epoxy primer, high-build, as recommended by coating manufacturer for specific galvanized metal, copper, or nonferrous metal alloy to be coated
Fusion Bonded Coating	100% solids, thermosetting, fusion bonded, dry powder epoxy, suitable for the intended service
TFE Lube or Grease Lube	Tetrafluoroethylene, liquid coating, or open gear grease as supplied by McMaster-Carr Supply Corporation, Elmhurst, IL
High Build Epoxy	Polyamidoamine epoxy, minimum 69% volume solids, capability of 4 to 8 MDFT per coat
Inorganic Zinc Primer	Solvent or water based, having 85% metallic zinc content in the dry film; follow manufacturer's recommendation for topcoating
Latex Primer Sealer	Waterborne vinyl acrylic primer/sealer for interior gypsum board and plaster. Capable of providing uniform seal and suitable for use with specified finish coats
NSF Epoxy	Polyamidoamine epoxy, approved for potable water contact and conforming to NSF 61
Epoxy, High Solids	Polyamidoamine epoxy, 80% volume solids, minimum, suitable for immersion service
Polyurethane Enamel	Two-component, aliphatic or acrylic based polyurethane; high gloss finish
Organic Zinc Rich Primer	Epoxy or moisture cured urethane with 85-percent zinc content in the dry film, meeting the requirements of RCSC Specification for Structural Joints using High Strength Bolts, Class A or Class B, as required.
Rust-Inhibitive Primer	Single-package steel primers with anticorrosive pigment loading

<b>Product</b>	<b>Definition</b>
Sanding Sealer	Co-polymer oil, clear, dull luster
Silicone/Silicone Acrylic	Elevated temperature silicone or silicone/acrylic based
Stain, Concrete	Acrylic, water repellant, penetrating stain
Stain, Wood	Satin luster, linseed oil, solid or transparent as required
Varnish	Nonpigmented vehicle based on a variety of resins (alkyd, phenolic, urethane) in gloss, semigloss, or flat finishes, as required
Water Base Epoxy	Two-component, polyamide epoxy emulsion, finish as required

## 2.04 MIXING

### A. Multiple-Component Coatings:

1. Prepare using each component as packaged by paint manufacturer.
2. No partial batches will be permitted.
3. Do not use multiple-component coatings that have been mixed beyond their pot life.
4. Furnish small quantity kits for touchup painting and for painting other small areas.
5. Mix only components specified and furnished by paint manufacturer.
6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

- B. Colors: Formulate paints with colorants free of lead, lead compounds, or other materials that might be affected by presence of hydrogen sulfide or other gas likely to be present at Site.

## 2.05 SHOP FINISHES

- A. Shop Blast Cleaning: Reference Paragraph, Shop Coating Requirements.
- B. Surface Preparation: Provide Engineer minimum 7 days' advance notice to start of shop surface preparation work and coating application work.

C. Shop Coating Requirements:

1. When required by equipment specifications, such equipment shall be primed and finish coated in shop by manufacturer and touched up in field with identical material after installation.
2. Where manufacturer's standard coating is not suitable for intended service condition, Engineer may approve use of a tie-coat to be used between manufacturer's standard coating and specified field finish. In such cases, tie-coat shall be surface tolerant epoxy as recommended by manufacturer of specified field finish coat. Coordinate details of equipment manufacturer's standard coating with field coating manufacturer.

D. Pipe:

1. Ductile Iron Pipe:
  - a. Use SSPC standards as a guide for desired prepared surface. Follow recommendations of pipe and coating manufacturers for means and methods to achieve SSPC-equivalent surface.
  - b. The surface preparation and application of the primer and finish coats shall be performed by pipe manufacturer.
  - c. For high performance (epoxy) coatings, follow additional recommendations of pipe and coating manufacturers.
  - d. Prior to blast cleaning, grind smooth surface imperfections, including, but not limited to delaminating metal or oxide layers.
  - e. For conventional (alkyd) coatings, clean asphalt varnish supplied on pipe and apply one full coat of a tar stop before two full coats of the color coats specified.
2. Steel Pipe:
  - a. Surface preparation and application of primer and finish coats shall be performed by pipe manufacturer.
  - b. For pipe with epoxy lining, do not place end cap seals until pipe lining material has sufficiently dried.

**PART 3 EXECUTION**

**3.01 GENERAL**

- A. Provide Engineer minimum 7 days' advance notice to start of field surface preparation work and coating application work.
- B. Perform the Work only in presence of Engineer, unless Engineer grants prior approval to perform the Work in Engineer's absence.
- C. Schedule inspection of cleaned surfaces and all coats prior to succeeding coat in advance with Engineer.

### 3.02 EXAMINATION

#### A. Factory Finished Items:

1. Schedule inspection with Engineer before repairing damaged factory-finished items delivered to Site.
2. Repair abraded or otherwise damaged areas on factory-finished items as recommended by coating manufacturer. Carefully blend repaired areas into original finish. If required to match colors, provide full finish coat in field.

#### B. Surface Preparation Verification: Inspect and provide substrate surfaces prepared in accordance with these Specifications and printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.

### 3.03 PROTECTION OF ITEMS NOT TO BE PAINTED

- A. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not specified elsewhere to be painted.
- B. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.
- C. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.
- D. Mask openings in motors to prevent paint and other materials from entering.
- E. Protect surfaces adjacent to or downwind of Work area from overspray.

### 3.04 SURFACE PREPARATION

#### A. Field Abrasive Blasting:

1. Perform blasting for items and equipment where specified and as required to restore damaged surfaces previously shop or field blasted and primed or coated.
2. Refer to coating systems for degree of abrasive blasting required.
3. Where the specified degree of surface preparation differs from manufacturer's recommendations, the more stringent shall apply.

B. Surface Contamination Testing:

1. A surface contamination analysis test shall be performed every 500 square feet by means of a Chlor Test CSN Salts or approved equivalent.
2. Surface with chloride levels exceeding 3 µg/square centimeter for submerged surfaces and 5 µg/square centimeter for exposed surfaces shall be treated with a liquid soluble salt remover equivalent to CHLOR\*RID (CHLOR\*RID International, Chandler, AZ).
3. Follow manufacturer's recommendations and procedures for the use of this product to remove the surface contamination.

C. Metal Surface Preparation:

1. Where indicated, meet requirements of SSPC Specifications summarized below:
  - a. SP 1, Solvent Cleaning: Removal of visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants by cleaning with solvent.
  - b. SP 2, Hand Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using nonpower hand tools.
  - c. SP 3, Power Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using power-assisted hand tools.
  - d. SP 5, White Metal Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter by blast cleaning.
  - e. SP 6, Commercial Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 33 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
  - f. SP 7, Brush-Off Blast Cleaning: Removal of visible rust, oil, grease, soil, dust, loose mill scale, loose rust, and loose coatings. Tightly adherent mill scale, rust, and coating may remain on surface.
  - g. SP 10, Near-White Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 5 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.

- h. SP 11, Power Tool Cleaning to Bare Metal: Removal of visible oil, grease, dirt, dust, mill scale, rust, paint, oxide, corrosion products, and other foreign matter using power-assisted hand tools capable of producing suitable surface profile. Slight residues of rust and paint may be left in lower portion of pits if original surface is pitted.
  - i. SP-16, Brush Blasting of Non-Ferrous Metals: A brush-off blast cleaned non-ferrous metal surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, metal oxides (corrosion products), and other foreign matter. Intact, tightly adherent coating is permitted to remain. A coating is considered tightly adherent if it cannot be removed by lifting with a dull putty knife. Bare metal substrates shall have a minimum profile of 19 micrometers (0.75 mil).
- 2. The words “solvent cleaning”, “hand tool cleaning”, “wire brushing”, and “blast cleaning”, or similar words of equal intent in these Specifications or in paint manufacturer’s specification refer to the applicable SSPC Specification.
- 3. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Coating manufacturers’ recommendations for wet blast additives and first coat application shall apply.
- 4. Ductile Iron Pipe Supplied with Asphaltic Varnish Finish: Remove asphaltic varnish finish prior to performing specified surface preparation.
- 5. Hand tool clean areas that cannot be cleaned by power tool cleaning.
- 6. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.
- 7. Welds and Adjacent Areas:
  - a. Prepare such that there is:
    - 1) No undercutting or reverse ridges on weld bead.
    - 2) No weld spatter on or adjacent to weld or any area to be painted.
    - 3) No sharp peaks or ridges along weld bead.
  - b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
- 8. Preblast Cleaning Requirements:
  - a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
  - b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
  - c. Clean small isolated areas as above or solvent clean with suitable solvent and clean cloth.

9. Blast Cleaning Requirements:
  - a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer's recommendations.
  - b. Select type and size of abrasive to produce surface profile that meets coating manufacturer's recommendations for particular primer to be used.
  - c. Use only dry blast cleaning methods.
  - d. Do not reuse abrasive, except for designed recyclable systems.
  - e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space entry (if required), and disposition of spent aggregate and debris.
10. Post-Blast Cleaning and Other Cleaning Requirements:
  - a. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wipe with a tack cloth.
  - b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.

D. Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation:

1. Remove soil, cement spatter, and other surface dirt with appropriate hand or power tools.
2. Brush blast in accordance with SSPC SP 16.
3. Obtain and follow coating manufacturer's recommendations for additional preparation that may be required.

E. Concrete Surface Preparation:

1. Do not begin until 30 days after concrete has been placed.
2. Meet requirements of SSPC SP 13.
3. Remove grease, oil, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent, or other suitable cleaning methods.
4. Brush-off blast clean to remove loose concrete and laitance, and provide a tooth for binding. Upon approval by Engineer, surface may be cleaned by acid etching method. Approval is subject to producing desired profile equivalent to No. 80 grit flint sandpaper. Acid etching of vertical or overhead surfaces shall not be allowed.

5. Secure coating manufacturer's recommendations for additional preparation, if required, for excessive bug holes exposed after blasting.
6. Unless otherwise required for proper adhesion, ensure surfaces are dry prior to painting.

F. Plastic and FRP Surface Preparation:

1. Hand sand plastic surfaces to be coated with medium grit sandpaper to provide tooth for coating system.
2. Large areas may be power sanded or brush-off blasted, provided sufficient controls are employed so surface is roughened without removing excess material.

G. Masonry Surface Preparation:

1. Complete and cure masonry construction for 14 days or more before starting surface preparation work.
2. Remove oil, grease, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent washing, or other suitable cleaning methods.
3. Clean masonry surfaces of mortar and grout spillage and other surface deposits using one of the following:
  - a. Nonmetallic fiber brushes and commercial muriatic acid followed by rinsing with clean water.
  - b. Brush-off blasting.
  - c. Water blasting.
4. Do not damage masonry mortar joints or adjacent surfaces.
5. Leave surfaces clean and, unless otherwise required for proper adhesion, dry prior to painting.
6. Masonry Surfaces to be Painted: Uniform texture and free of surface imperfections that would impair intended finished appearance.
7. Masonry Surfaces to be Clear Coated: Free of discolorations and uniform in texture after cleaning.

H. Wood Surface Preparation:

1. Replace damaged wood surfaces or repair in a manner acceptable to Engineer prior to start of surface preparation.
2. Solvent clean (mineral spirits) knots and other resinous areas and coat with shellac or other knot sealer, prior to painting. Remove pitch by scraping and wipe clean with mineral spirits or turpentine prior to applying knot sealer.



3. Round sharp edges by light sanding prior to priming.
  4. Filler:
    - a. Synthetic-based wood putty approved by paint manufacturer for paint system.
    - b. For natural finishes, color of wood putty shall match color of finished wood.
    - c. Fill holes, cracks, and other surface irregularities flush with surrounding surface and sand smooth.
    - d. Apply putty before or after prime coat, depending on compatibility and putty manufacturer's recommendations.
    - e. Use cellulose type putty for stained wood surfaces.
  5. Ensure surfaces are clean and dry prior to painting.
- I. Gypsum Board Surface Preparation: Typically, new gypsum board surfaces need no special preparation before painting.
1. Surface Finish: Dry, free of dust, dirt, powdery residue, grease, oil, or any other contaminants.
- J. Existing Painted Surfaces to be Repainted Surface Preparation:
1. Detergent wash and freshwater rinse.
  2. Clean loose, abraded, or damaged coatings to substrate by hand or power tool, SP 2 or SP 3.
  3. Feather surrounding intact coating.
  4. Apply one spot coat of specified primer to bare areas, overlapping prepared existing coating.
  5. Apply one full finish coat of specified primer to entire surface.
  6. If an aged, plural-component material is to be topcoated, contact coating manufacturer for additional surface preparation requirements.
  7. Application of Cosmetic Coat:
    - a. It is assumed that existing coatings have oxidized sufficiently to prevent lifting or peeling when overcoated with paints specified.
    - b. Check compatibility by application to a small area prior to starting painting.
    - c. If lifting or other problems occur, request disposition from Engineer.
  8. Perform blasting as required to restore damaged surfaces. Materials, equipment, procedures shall meet requirements of SSPC.

### 3.05 SURFACE CLEANING

- A. Brush-off Blast Cleaning:
1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC SP 7.
  2. Abrasive: Either wet or dry blasting sand, grit, or nutshell.

3. Select various surface preparation parameters, such as size and hardness of abrasive, nozzle size, air pressure, and nozzle distance from surface such that surface is cleaned without pitting, chipping, or other damage.
4. Verify parameter selection by blast cleaning a trial area that will not be exposed to view.
5. Engineer will review acceptable trial blast cleaned area and use area as a representative sample of surface preparation.
6. Repair or replace surface damaged by blast cleaning.

B. Acid Etching:

1. After precleaning, spread the following solution by brush or plastic sprinkling can: One part commercial muriatic acid reduced by two parts water by volume. Adding acid to water in these proportions gives an approximate 10 percent solution of HCl.
2. Application:
  - a. Rate: Approximately 2 gallons per 100 square feet.
  - b. Work acid solution into surface by hard-bristled brushes or brooms until complete wetting and coverage is obtained.
  - c. Acid will react vigorously for a few minutes, during which time brushing shall be continued.
  - d. After bubbling subsides (10 minutes), hose down remaining slurry with high pressure clean water.
  - e. Rinse immediately to avoid formation on the surface of salts that are difficult to remove.
  - f. Thoroughly rinse to remove any residual acid surface condition that may impair adhesion.
3. Ensure surface is completely dry before application of coating.
4. Apply acid etching to obtain a "grit sandpaper" surface profile. If not, repeat treatment.

C. Solvent Cleaning:

1. Consists of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by using solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods that involve a solvent or cleaning action.
2. Meet requirements of SSPC SP 1.

## 3.06 APPLICATION

## A. General:

1. The intention of these Specifications is for existing and new, interior and exterior wood, masonry, concrete, and metal, and submerged metal surfaces to be painted, whether specifically mentioned or not, except as specified otherwise. Do not paint exterior concrete surfaces, unless specifically indicated.
2. Extent of Coating (Immersion): Coatings shall be applied to internal vessel and pipe surfaces, nozzle bores, flange gasket sealing surfaces, carbon steel internals, and stainless steel internals, unless otherwise specified.
3. For coatings subject to immersion, obtain full cure for completed system. Consult coatings manufacturer's written instructions for these requirements. Do not immerse coating until completion of curing cycle.
4. Apply coatings in accordance with these Specifications and paint manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.
5. Sand wood lightly between coats to achieve required finish.
6. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
7. Fusion Bonded Coatings Method Application: Electrostatic, fluidized bed, or flocking.
8. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
9. Water-Resistant Gypsum Board: Use only solvent type paints and coatings.
10. On pipelines, terminate coatings along pipe runs to 1 inch inside pipe penetrations.
11. Keep paint materials sealed when not in use.
12. Where more than one coat is applied within a given system, alternate colors to provide a visual reference showing required number of coats have been applied.

## B. Galvanized Metal, Copper, and Nonferrous Metal Alloys:

1. Concealed galvanized, copper, and nonferrous metal alloy surfaces (behind building panels or walls) do not require painting, unless specifically indicated herein.
2. Prepare surface and apply primer in accordance with System No. 10 specification.
3. Apply intermediate and finish coats of the coating system appropriate for the exposure.

C. Porous Surfaces, Such As Concrete and Masonry:

1. Filler/Surfacer: Use coating manufacturer's recommended product to fill air holes, bug holes, and other surface voids or defects.
2. Prime Coat: May be thinned to provide maximum penetration and adhesion.
  - a. Type and Amount of Thinning: Determined by paint manufacturer and dependent on surface density and type of coating.
3. Surface Specified to Receive Water Base Coating: Damp, but free of running water, just prior to application of coating.

D. Film Thickness and Coverage:

1. Number of Coats:
  - a. Minimum required without regard to coating thickness.
  - b. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturers' products, and atmospheric conditions.
2. Application Thickness:
  - a. Do not exceed coating manufacturer's recommendations.
  - b. Measure using a wet film thickness gauge to ensure proper coating thickness during application.
3. Film Thickness Measurements and Electrical Inspection of Coated Surfaces:
  - a. Perform with properly calibrated instruments.
  - b. Recoat and repair as necessary for compliance with specification.
  - c. Coats are subject to inspection by Engineer and coating manufacturer's representative.
4. Visually inspect concrete, masonry, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.
5. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.
6. Apply additional coats as required to achieve complete hiding of underlying coats. Hiding shall be so complete that additional coats would not increase the hiding.

## 3.07 PROTECTIVE COATINGS SYSTEMS AND APPLICATION SCHEDULE

- A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.
- B. System No. 2 Submerged Metal—Domestic Sewage:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 5, White Metal Blast Cleaning	Prime in accordance with manufacturer's recommendations	
	Coal-Tar Epoxy -OR- High Build Epoxy	2 coats, 16 MDFT  2 coats, 16 MDFT

1. Use on the following items or areas:
  - a. Metal surfaces new and below a plane 1 foot above maximum liquid surface, metal surfaces above maximum liquid surface that are a part of immersed equipment, concrete embedded surfaces of metallic items, such as wall pipes, pipes, pipe sleeves, access manholes, gate guides and thimbles, and structural steel, and the following specific surfaces:
    - 1) Interior surfaces of steel piping noted in the Piping Schedule.
    - 2) Submersible pumps and discharge piping within wet well.
  - b. On ferrous metal surfaces of other equipment items and component assemblies as specified in the Technical Specifications or as identified on the Contract Drawings.

- C. System No. 4 Exposed Metal—Highly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Epoxy Primer— Ferrous Metal	1 coat, 2.5 MDFT
	High Build Epoxy	1 coat, 4 MDFT
	Polyurethane Enamel	1 coat, 3 MDFT

1. Use on the following items or areas:
  - a. Exposed ferrous metal surfaces, new and existing located inside or outside of structures and exposed to weather, and the following specific surfaces:
    - 1) Piping as noted on the Piping Schedule.

- 2) Above grade or exposed pipe, fittings and related items.
- 3) Valves and other related accessories associated with piping systems.
- 4) Biosolids Holding Tank steel base skirt.
- 5) Side-Entry mounted tank agitators.
- 6) Crane Runway Beam Assembly in Facility 20 excluding stainless steel elements.
- 7) Monorail Runway Beam Assembly in Facility 50 excluding stainless steel elements.
- b. On ferrous metal surfaces of other equipment items and component assemblies as specified in the Technical Specifications or as identified on the Contract Drawings.

D. System No. 5 Exposed Metal—Mildly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Epoxy Primer—Ferrous Metal	1 coat, 2.5 MDFT
	Polyurethane Enamel	1 coat, 3 MDFT

1. Use on the following items or areas:
  - a. Exposed metal surfaces, new and existing located inside or outside of structures and exposed to weather or in a highly humid atmosphere, such as pipe galleries and similar areas, and the following specific surfaces:
    - 1) Equipment (e.g. pumps, motors, grinders, and related accessories, etc.).

E. System No. 6 Exposed Metal—Atmospheric:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	Rust-Inhibitive Primer	1 coat, 2 MDFT
	Alkyd Enamel	2 coats, 4 MDFT

1. Use on the following items or areas:
  - a. Exposed metal surfaces, new and located inside or outside of structures or exposed to weather, including metal doors and frames, vents, louvers, exterior metal ductwork, flashing, sheet metalwork and miscellaneous architectural metal trim, and the following specific surfaces:
    - 1) Inside duct stack heads behind diffusers, registers, and grilles with flat black.
    - 2) Instrumentation and control systems exposed enclosures for process.

- b. On ferrous metal surfaces of other equipment items and component assemblies as specified in the Technical Specifications or as identified on the Contract Drawings.
- c. Apply surface preparation and primer to surfaces prior to installation. Finish coats need only be applied to surfaces exposed after completion of construction.

F. System No. 7 Concrete Encased Metal:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	Coal-Tar Epoxy	2 coats, 16 MDFT

- 1. Use on the following items or areas:
  - a. Use on concrete encased ferrous metals including wall pipes, pipe sleeves, access manholes, gate guides, and thimbles.
  - b. On ferrous metal surfaces of other equipment items and component assemblies as specified in the Technical Specifications or as identified on the Contract Drawings.

G. System No. 8 Buried Metal—General:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Standard Hot Coal-Tar Enamel -OR- Coal-Tar Epoxy	AWWA C203  2 coats, 16 MDFT
	For Highly Abrasive Soil, Brackish Water: Tape Coat System	AWWA C214 with Double Outer Wrap

- 1. For steel pipe and fittings, follow AWWA C209 and AWWA C214 with double outer wrap.
- 2. Use on the following items or areas:
  - a. Buried, below grade portions of steel items, except buried stainless steel or ductile iron.
  - b. On ferrous metal surfaces of other equipment items and component assemblies as specified in the Technical Specifications or as identified on the Contract Drawings.

H. System No. 10 Galvanized Metal, Copper, and Nonferrous Metal Alloy Conditioning:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation	Epoxy Primer—Other	As recommended by coating manufacturer  Remaining coats as required for exposure

1. Use on the following items or areas:
  - a. Galvanized surfaces requiring painting.
  - b. After application of System No. 10, apply finish coats as required for exposure.

I. System No. 25 Exposed FRP, PVC:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Plastic and FRP Surface Preparation	Acrylic Latex Semigloss	2 coats, 320 SFPGPC

1. Use on the following items or areas:
  - a. All exposed-to-view PVC and CPVC surfaces, and FRP surfaces without integral UV-resistant gel coat except PVC located indoors with the exception of PVC carrying chlorine or sulfur dioxide. Requirements of Section 10 4 00 for labeling of piping remain in place.

J. System No. 27 Aluminum and Dissimilar Metal Insulation:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1)	Prime in accordance with manufacturer's recommendations	
	Bituminous Paint	1 coat, 10 MDFT

1. Use on aluminum surfaces embedded or in contact with concrete.



## K. System No. 28 Exposed Concrete:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Concrete Surface Preparation	Epoxy Filler/Surfacer	1 coat, as required to fill all surface voids.
	High Build Epoxy	2 coats, 200 SFPG/coat

1. Use on the following items or areas:
  - a. Exterior surfaces of above grade double-walled fuel storage tank.

## L. System No. 29 Fusion Bonded Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Fusion Bonded Coating 100% Solids Epoxy	1 or 2 coats, 12 MDFT

1. For all interior and exterior surfaces of steel pipe and fittings where identified in the technical Specifications. Meet all requirements of AWWA C213.
2. Anchor bolts.

## 3.08 ARCHITECTURAL PAINT SYSTEMS AND APPLICATION SCHEDULE

- A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.
- B. As shown in Finish Schedule on Drawings.
- C. System No. 106 Galvanized Metal:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation	Manufacturer's Recommended Primer	1 coat, as recommended by manufacturer
	Alkyd Enamel (Semigloss)	2 coats, 4 MDFT

1. Use on the following items or areas: Hollow metal frames and doors.

D. System No. 115 Gypsum Board and Plaster, Egg Shell:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Gypsum Board Surface Preparation	Latex Primer/Sealer	1 coat, 350 SFPG
	Acrylic Latex (Semigloss) or Alkyd (Egg Shell)	2 coats, 400 SFPGPC

1. Use on the following items or areas: Dewatering Building.

E. System No. 117 Concrete Masonry, Gloss Epoxy:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Masonry Surface Preparation	Block Filler	1 coat, 75 SFPG
	Water Base Epoxy (Gloss)	2 coats, 300 SFPGPC

1. Use on the following items or areas:
  - a. Exposed CMU walls in the Dewatering and Chlorine buildings.

### 3.09 COLORS

- A. Provide as shown for equipment and appurtenances and designated herein, as shown in Piping Schedule or selected by Engineer.
- B. Proprietary identification of colors is for identification only. Selected manufacturer may supply matches.
- C. Equipment Colors:
  1. Equipment includes the machinery or vessel itself plus the structural supports and fasteners and attached electrical conduits.
  2. Paint equipment and piping one color as selected.
  3. Paint nonsubmerged portions of equipment the same color as the piping it serves, except as itemized below:
    - a. Dangerous Parts of Equipment and Machinery: OSHA Orange.
    - b. Fire Protection Equipment and Apparatus: OSHA Red.

- c. Radiation Hazards: OSHA Purple.
- d. Physical hazards in normal operating area and energy lockout devices, including, but not limited to, electrical disconnects for equipment and equipment isolation valves in air and liquid lines under pressure: OSHA Yellow.

**D. Pipe Identification Painting:**

1. Color code nonsubmerged metal piping, except electrical conduit. Paint fittings and valves the same color as pipe, except equipment isolation valves.
2. Pipe Color Coding: In accordance with Piping Schedule.
3. On exposed stainless steel piping, apply color 24 inches in length along pipe axis at connections to equipment, valves, or branch fittings, at wall boundaries, and at intervals along piping not greater than 9 feet on center.
4. Pipe Supports: Painted light gray, as approved by Owner.
5. Fiberglass reinforced plastic (FRP) pipe, polyvinylidene fluoride (PVDF), and polyvinyl chloride (PVC) pipe located inside of buildings and enclosed structures will not require painting, except as noted or scheduled.

**E. Pipe System Color Code:**

<b>Pipe System</b>	<b>Color</b>
Chlorine, Gas	Federal Safety Yellow
Chlorine, Residual Sampling	Silver/Gray
Chlorine Solution	Federal Safety Yellow
Chlorine Ejector Water	Silver/Gray
Chlorine Vent	Federal Safety Yellow
Compressed Air	Federal Safety Purple
Drains and Sludge	Light Brown
Dewatering	Black
Drains	Black
Fuel Oil Supply	Yellow
Fuel Oil Return	Yellow
Plant Service Water	Medium Blue
Potable Water	Light Blue

Pipe System	Color
Raw Sewage	Dark Gray
Seal Water	Federal Safety Blue
Sludge, Digested	Dark Brown
Sulfur Dioxide, Gas	Federal Safety Yellow w/ Red Stripes
Sulfur Dioxide Solution	Federal Safety Yellow w/ Red Stripes

### 3.10 FIELD QUALITY CONTROL

#### A. Testing Equipment:

1. Provide calibrated electronic type dry film thickness gauge to test coating thickness specified in mils.
2. Provide low-voltage wet sponge electrical holiday detector to test completed coating systems, 20 mils dry film thickness or less, except zinc primer, high-build elastomeric coatings, and galvanizing, for pinholes, holidays, and discontinuities, as manufactured by Tinker and Rasor, San Gabriel, CA, Model M-1.
3. Provide high-voltage spark tester to test completed coating systems in excess of 20 mils dry film thickness. Unit as recommended by coating manufacturer.

#### B. Testing:

1. Thickness and Continuity Testing:
  - a. Measure coating thickness specified in mils with a magnetic type, dry film thickness gauge, in accordance with SSPC PA 2. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after application of coating.
  - b. Holiday detect coatings 20 mils thick or less, except zinc primer and galvanizing, with low voltage wet sponge electrical holiday detector in accordance with NACE SP0188.
  - c. Holiday detect coatings in excess of 20 mils dry with high voltage spark tester as recommended by coating manufacturer and in accordance with NACE SP0188.
  - d. After repaired and recoated areas have dried sufficiently, retest each repaired area. Final tests may also be conducted by Engineer.

- C. Inspection: Leave staging and lighting in place until Engineer has inspected surface or coating. Replace staging removed prior to approval by Engineer. Provide additional staging and lighting as requested by Engineer.
- D. Unsatisfactory Application:
  - 1. If item has an improper finish color or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.
  - 2. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.
  - 3. Repair defects in accordance with written recommendations of coating manufacturer.
- E. Damaged Coatings, Pinholes, and Holidays:
  - 1. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.
  - 2. Remove rust and contaminants from metal surface. Provide surface cleanliness and profile in accordance with surface preparation requirements for specified paint system.
  - 3. Feather edges and repair in accordance with recommendations of paint manufacturer.
  - 4. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.

### 3.11 MANUFACTURER'S SERVICES

- A. In accordance with Section 01 43 33, Manufacturers' Field Services, coating manufacturer's representative shall be present at Site as follows:
  - 1. On first day of application of any coating system.
  - 2. A minimum of two additional Site inspection visits, each for a minimum of 4 hours, in order to provide Manufacturer's Certificate of Proper Installation.
  - 3. As required to resolve field problems attributable to or associated with manufacturer's product.
  - 4. To verify full cure of coating prior to coated surfaces being placed into immersion service.

3.12 CLEANUP

- A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at end of each day.
- B. Upon completion of the Work, remove staging, scaffolding, and containers from Site or destroy in a legal manner.
- C. Remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

3.13 SUPPLEMENTS

- A. The supplements listed below, following “End of Section,” are a part of this Specification:
  - 1. Paint System Data Sheet (PSDS).
  - 2. Product Data Sheet (PDS).

**END OF SECTION**

**PAINT SYSTEM DATA SHEET**

Complete this PSDS for each coating system, include all components of the system (surface preparation, primer, intermediate coats, and finish coats). Include all components of a given coating system on a single PSDS.

Paint System Number (from Spec.):		
Paint System Title (from Spec.):		
Coating Supplier:		
Representative:		
Surface Preparation:		
<b>Paint Material (Generic)</b>	<b>Product Name/Number (Proprietary)</b>	<b>Min. Coats, Coverage</b>





**PAINT PRODUCT DATA SHEET**

Complete and attach manufacturer's Technical Data Sheet to this PDS for each product submitted. Provide manufacturer's recommendations for the following parameters at temperature (F)/relative humidity:

<b>Temperature/RH</b>	<b>50/50</b>	<b>70/30</b>	<b>90/25</b>
Induction Time			
Pot Life			
Shelf Life			
Drying Time			
Curing Time			
Min. Recoat Time			
Max. Recoat Time			

Provide manufacturer's recommendations for the following:

Mixing Ratio: \_\_\_\_\_

Maximum Permissible Thinning: \_\_\_\_\_

Ambient Temperature Limitations: min. : \_\_\_\_\_ max.: \_\_\_\_\_

Surface Temperature Limitations: min.: \_\_\_\_\_ max.: \_\_\_\_\_

Surface Profile Requirements: min.: \_\_\_\_\_ max.: \_\_\_\_\_

Attach additional sheets detailing manufacturer's recommended storage requirements and holiday testing procedures.



**SECTION 09 97 23  
WATERPROOF COATING**

**PART 1      GENERAL**

**1.01      GENERAL**

**A.      SUMMARY**

1.      Section Includes: Application of water-based, high-build, 100 percent acrylic, waterproof coating.

- B.      Related Sections:** Section 09 90 00, Painting and Coating.

**1.02      SUBMITTALS**

- A.      Comply with Section 01 33 00, Submittal Procedures.**

- B.      Product Data:** Submit manufacturer's technical data sheets.

- C.      Submit list of project references as documented in this Specification under Quality Assurance Article. Include contact name and phone number of the person charged with oversight of each project.**

- D.      Quality Control Submittals:** Provide protection plan of surrounding areas and non-cementitious surfaces.

**1.03      QUALITY ASSURANCE**

**A.      Qualifications:**

1.      Manufacturer Qualifications: Company with minimum 15 years of experience in manufacturing of specified products.
2.      Manufacturer Qualifications: Company shall be ISO 9001:2000 Certified.
3.      Applicator Qualifications: Company with minimum of 5 years' experience in application of specified products on projects of similar size and scope and is acceptable to product manufacturer.
  - a.      Successful completion of a minimum of 5 projects of similar size and complexity to specified work.

B. Field Sample:

1. Install at project site or another pre-selected area of the structure, minimum 4 feet by 4 feet (1.2 m by 1.2 m), using specified material.
2. Apply material in accordance with manufacturer's written application instructions.
3. Manufacturer's representative or designated representative will review technical aspects; surface preparation, repair and workmanship.
4. Field sample will be standard for judging workmanship on remainder of Project.
5. Maintain field sample during construction for workmanship comparison.
6. Do not alter, move, or destroy field sample until work is completed and approved by architect/engineer.
7. Obtain architect/engineer written approval of field sample before start of material application, including approval of aesthetics, color, texture and appearance.
8. Perform adhesion test in accordance with ASTM D3359, Method A. Minimum adhesion rating of 4A required on 0 to 5 scale.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store tightly sealed materials off ground and away from moisture, direct sunlight, extreme heat and freezing temperatures.

1.05 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not apply material when substrate or ambient temperature is 40 degrees F (4 degrees C) or below or is expected to fall below 40 degrees F (4 degrees C) within 24 hours after application.
2. Do not apply material if rain is expected within 24 hours of application.
3. Do not apply over moving cracks, control joints, or expansion joints.
4. Do not apply to horizontal traffic-bearing surfaces.

## **PART 2      PRODUCTS**

### **2.01      MANUFACTURERS**

- A.    Subject to compliance with requirements, provide products from the following manufacturer:
- BASF Corporation  
Construction Chemicals  
889 Valley Park Drive  
Shakopee, MN 55379 USA  
Customer Service: 800- 433-9517  
Technical Service: 800-243-6739  
Direct Phone: 952-496-6000  
Website: [www.master-builders-solutions.basf.us](http://www.master-builders-solutions.basf.us)
- B.    Specifications and drawings are based on manufacturer's proprietary literature from BASF. Other manufacturers shall comply with minimum levels of material, color selection, and detailing indicated in Specifications or on Drawings. Architect/engineer will be sole judge of appropriateness of substitutions.
- C.    Manufacturers as listed under 09 90 00 are acceptable alternate manufacturers.

### **2.02      MATERIALS**

- A.    Water-based, high-build, 100 percent acrylic, waterproof coating.
1.    Acceptable Product: MasterProtect HB 400 (Formerly Thorocoat) by BASF.
- B.    MasterProtect HB 400 Coarse:
1.    Density, ASTM D1475: 13.2 to 14.2 lbs per gal (1.58 to 1.70 kg/L).  
2.    Solids Content, ASTM D5201:  
    a.    By Weight: 67.0 – 71.6 percent.  
    b.    By Volume: 50 percent.  
3.    Viscosity, ASTM D562: 117 to 125 KU.  
4.    VOC Content, ASTM D3960: 0.59 lbs per gal (70 g/L), less water and exempt solvents.
- C.    Performance Requirements: MasterProtect HB 400 Smooth:
1.    Resistance to Wind-Driven Rain, Federal Specification ASTM D6904: Meets requirement. No water penetration.  
2.    Accelerated Weathering, ASTM G152, 5,000 hours: Passes.

3. Visual Color Change, ASTM D1729, 5,000 hours: Passes.
  4. Chalking, ASTM D4214, 5,000 hours: Passes.
  5. Freeze/Thaw Resistance, DOT Methods A and B, 50 cycles: Passes.
  6. Water-Vapor Permeance, ASTM D1653: 13 perms.
  7. Moisture Resistance, Federal Specification TT-C-555B: Meets requirement. No blistering, loss of adhesion, or discoloration.
  8. Salt Spray (Fog) Resistance, ASTM B117, 300 hours: Passes.
  9. Carbon-Dioxide Diffusion, PR EN 1062-6:
    - a. R (equivalent air-layer thickness): 1,318 feet (402 m).
    - b. Sc (equivalent concrete thickness): 39 inches (100 cm).
  10. Flexibility, ASTM D1737, 1-inch mandrel: No cracking.
  11. Dirt Pick-Up, ASTM D3719, after 6 months exposure: 92 percent passes.
  12. Sand Abrasion Resistance, ASTM D968, Method A, at 3,000 L: Passes.
  13. Impact Resistance, ASTM D2794, at 30 in-lbs: Passes.
  14. Fungus Resistance, ASTM D3273: No growth. Meets requirement.
  15. Mildew Resistance, Federal Specification TT-P-29 (Federal Standard 141, Method 6152 and 6271.1):
    - a. Aspergillus Oryzae, 7 days: No growth.
    - b. Aspergillus Niger, 21 days: No growth.
  16. Surface Burning Characteristics, ASTM E84:
    - a. Flame Spread: 1.
    - b. Smoke: 4.
    - c. Fuel Contribution: 7.
  17. Flash point, Greater than 200 degrees F (93 degrees C) ASTM D56 Tag Closed Tester.
- D. Approximate Coverage Rate: 75 to 100 sq ft per gal (1.84 to 2.46 m<sup>2</sup>/L).
- E. Wet Film Thickness (WFT):
1. Coarse: 16 to 22 mils (406 to 559 microns).
- F. Dry Film Thickness (DFT):
1. Coarse: 8 to 11 mils (203 to 279 microns).
- G. Colors: To be selected by Owner.
- H. Texture: Coarse.

## **PART 3 EXECUTION**

### **3.01 SURFACE PREPARATION**

- A. Protection: Protect adjacent work areas and finish surfaces from damage during coating application.
- B. Prepare surfaces in accordance with manufacturer's instructions.
- C. Ensure that substrate is sound, clean, dry, and free of dust, dirt, oils, grease, laitance, efflorescence, mildew, fungus, biological residues, and other contaminants that could prevent proper adhesion.
- D. Ensure concrete substrates have a minimum 28-day cure and are free of bond-inhibiting contaminants.
- E. Clean surface to achieve texture similar to medium-grit sandpaper.
- F. Repair holes and spalled and damaged concrete with repair materials approved by coating manufacturer.
- G. Near white Blast embedded metal accessories including dovetail anchor slots and brick ties. Smooth out irregularities. See Specification Section 09 90 00, Painting and Coating for metal surface preparation requirements for Near White Blast.
- H. When chemical cleaners are used, neutralize compounds and fully rinse surface with clean water. Allow surface to dry before proceeding.
- I. Remove blisters or delaminated areas and sand edges to smooth rough areas and provide transition to existing paint areas.
- J. Check adhesion of existing paint in accordance with ASTM D3359, measuring adhesion by Tape Method A.
- K. Treat cracks greater than 1/32 inch (0.8 mm) with knife-grade or brush-grade patching compound.
- L. Treat cracks greater than 1/4 inch (6 mm) as expansion joints and fill with sealant approved by coating manufacturer.
- M. Prepare and treat cracks in accordance with manufacturer's instructions.

### **3.02 PRIMING**

- A. Apply primer in accordance with manufacturer's instructions.

## C.C. Williams WWTP Dewatering

- B. Use primer approved by coating manufacturer.
- C. Brush Prime embedded metal surfaces with Epoxy Primer compatible with the finish system.

### 3.03 MIXING

- A. Mix coating in accordance with manufacturer's instructions to ensure uniform color and aggregate disbursement and to minimize air entrapment.
- B. In multi-pail applications, mix contents of each new pail into partially used pail to ensure color consistency and smooth transitions from pail to pail.

### 3.04 APPLICATION

- A. Apply coating in accordance with manufacturer's instructions.
- B. Apply coating as a two-coat system.
- C. Maintain proper uniform wet-film thickness during application to ensure performance characteristics desired.
- D. Apply coating using consistent application techniques to achieve uniform color and texture.

### 3.05 PROTECTION

- A. Protect applied coating from damage during construction.

**END OF SECTION**



**SECTION 10 14 00  
SIGNAGE**

**PART 1 GENERAL**

**1.01 REFERENCES**

- A. The following is a list of standards that may be referenced in this section:
1. American Society of Mechanical Engineers (ASME): A13.1, Scheme for the Identification of Piping Systems.
  2. ASTM International (ASTM):
    - a. A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
    - b. D709, Standard Specification for Laminated Thermosetting Materials.
  3. National Fire Protection Association (NFPA):
    - a. 704, Standard System for the Identification of the Hazards of Materials for Emergency Response.
    - b. HAZ-01, Fire Protection Guide to Hazardous Materials.
  4. Occupational Safety and Health Act (OSHA).

**1.02 SUBMITTALS**

- A. Action Submittals:
1. Shop Drawings:
    - a. Drawings showing layouts, actual letter sizes and styles, and Project-specific mounting details.
    - b. Manufacturer's literature showing letter sizes and styles, sign materials, and standard mounting details.
  2. Samples: One full size for each type of nameplate, sign, and label specified.
  3. One letter sample of the Channel letters proposed for the Entrance Sign. May be one of the actual letters to be installed.
- B. Informational Submittals: Manufacturer's installation instructions.

## **PART 2      PRODUCTS**

### **2.01      GENERAL**

- A. 5.5 inches by 5.5 inches minimum size with square corners. Minimum 2-layer acrylic, 1/8-inch thick.
  - 1. All space identification signs throughout the campus shall be matching in style and color and font size and style.
  - 2. Signs A must be all from the same sign product system.
  - 3. Color background shall be in contrast selected by Owner to contrast with block Helvetica lettering. Manufacturer to recommend font size for signs sized as stated above.
- B. ADA Compliant. Tactile characters/symbols both in reading words and Grade 2 Braille shall be raised 1/32 inch from the sign plate face. ADA code compliant. Use symbols of accessibility in compliance with the International Accessibility Code.

### **2.02      ACRYLIC ADA SPACE NAME PLAQUES (TYPE A INTERIOR)**

- A. Specific scheduled spaces shall have sign mounted in compliance with International Accessibility Code. Toilet Rooms, Stairs, Elevator and common facilities will have Braille lettering as well. All Space identification signs shall be ADA Compliant. Spaces shall include room names, space names, and signs for toilet facilities, shower facilities, locker rooms, and safety messages throughout the buildings.

### **2.03      ACRYLIC-SPACE NAME PLAQUES (TYPE A-1 INTERIOR)**

- A. Specific scheduled spaces shall have sign mounted in compliance with International Accessibility Code. The sign will have one line for permanent rooms name and one line with a slot where the name of the employee can be placed. (paper using a commercial printer).
- B. Owner will supply Contractor with name list.

### **2.04      PAINTED METAL SIGNS (Type B)**

- A. Parking Handicapped signs will be provided and installed on posts in compliance with the International Accessibility Code.
- B. Material: Baked enamel finished 20-gauge (minimum) steel or 18-gauge (minimum) aluminum signs.

C. Manufacturers:

1. Seton Identification Products.
2. Nutheme Illustrated Safety Co.

2.05 FIBERGLASS SIGN (EXTERIOR) TYPE F

A. Material: Three-ply laminated fiberglass, minimum 1/8-inch thick, with contrasting color core message layer between two clear weather-resistant surface layers.

B. Manufacturers:

1. Best Manufacturing Co.
2. Brady Signmark.

2.06 SPECIALTY SIGNS (TYPE S)

A. General:

1. Fiberglass Type F sign adjacent to the Tank Fill Station.
2. Fasten to wall with 1/4-inch Type 304 stainless steel fasteners.
3. Anchor in place for easy removal and reinstallation with ordinary hand tools.

B. Specialty Message Sign- Polymer Storage Tank Fill Station:

1. Text of message to read as follows:

“POLYMER STORAGE TANK FILL STATION”

2.07 WASTEWATER TREATMENT PLANT ENTRANCE SIGN

1. The Engineer will prepare Drawings for the sign and shall submit to the County building department for permit approval.
2. Provide a new entrance sign as described below:
  - a. Foundation shall be a minimum of 18-inch deep by 3 feet – 6-inch wide, #5 rebar, each way, top and bottom of slab.
  - b. 8-inch cast in place concrete wall.
  - c. 2 feet minus 0-inch Square Brick Veneer Columns.
  - d. Textured finish and smooth finish as shown on Drawings.
  - e. See Architectural drawings for letter dimensions.
  - f. All hardware to mount the sign to be Type 316 stainless steel.
  - g. See Electrical Drawings for lighting.

## 2.08 IDENTIFICATION LABELS

### A. Pipe Labels:

1. Snap-on, reversible type with lettering and directional arrows, sized for outside diameter of pipe and insulation.
2. Provided with ties or straps for pipes of 6 inches and over diameter.
3. Designed to firmly grip pipe so labels remain fixed in vertical pipe runs.
4. Material: Heavy-duty vinyl or polyester, suitable for exterior use, long lasting, and resistance to moisture, grease, and oils.
5. Letters and Arrows: Black on OSHA safety yellow background.
6. Color Field and Letter Height: Meet ASME A13.1.
7. Message: Piping system name as indicated on Piping Schedule.
8. Manufacturers and Products:
  - a. Brady Signmark; B-915 BradySnap-On and Strap-On Pipe Markers.
  - b. Seton Identification Products; Ultra-mark Pipe Markers.

### B. Equipment Labels:

1. Applies to equipment with assigned tag numbers, where specified.
2. Letters: Black bold face, 3/4-inch minimum high.
3. Background: OSHA safety yellow.
4. Materials: Aluminum or stainless steel with a baked-on finish suitable for use on wet, oily, exposed, abrasive, and corrosive areas.
5. Furnish 1-inch margin with holes at each end of label, for mounting. On fiberglass labels, furnish grommets at each hole.
6. Size:
  - a. 2 inches minimum and 3 inches maximum high, by 14 inches minimum and 18 inches maximum long.
  - b. Furnish same size base dimensions for all labels.
7. Message: Equipment names and tag numbers as used in sections where equipment is specified.
8. Manufacturers:
  - a. Brady Signmark.
  - b. Seton Identification Products.

## 2.09 ANCILLARY MATERIALS

- A. Fasteners: Stainless steel screws or bolts of appropriate sizes.
- B. Wood Posts: Preservative treated 4 by 4 wood as specified in Section 06 10 00, Rough Carpentry.

- C. Pipe Posts: 2-1/2-inch galvanized steel pipe meeting ASTM A53/A53M, Type S, Grade B.
- D. Chain: Type 304 stainless steel, No. 16 single jack chain or No. 2 double loop coil chain.
- E. Manufacturer's standard brackets for wall mounting of two-sided exit signs.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION—GENERAL**

- A. In accordance with manufacturer's recommendations.
- B. Mount securely, plumb, and level.

### **3.02 DOOR NAMEPLATES AND PICTORIAL SYMBOLS**

- A. Attach to doors with self-sticking permanent adhesive. See Door and Hardware Schedule for locations and messages.
- B. Mount with bottom of nameplate at 5 feet 6 inches above floor.

### **3.03 SIGNS**

- A. General:
  - 1. Fasten to walls or posts, or hang as scheduled.
  - 2. Anchor in place for easy removal and reinstallation with ordinary hand tools.
- B. Information, Exit, and Safety Signs: Install facing traffic. Locate for high visibility with minimum restriction of working area around walkways and equipment.
- C. Hazardous Material Sign:
  - 1. Install where required by NFPA No. 704 and IFC, Chapter 27.
  - 2. Install at entrances to spaces where hazardous materials are stored, dispensed, used, or handled, and on sides of stationary tanks.

## 3. Specific Materials:

Sign Schedule—Hazardous Material Signs								
Mark	Material	Health Hazard (Blue)	Flammability Hazard (Red)	Instability Hazard (Yellow)	Special Hazard (White)	Location	Mounting Method	Height to Top
H-1	Diesel Fuel, No. 2	1	2	0		All four sides of above grade bulk fuel storage tank.	Bolts	5'-6"
H-3	Sulfur Dioxide	3	0	0		Wall	Bolts	5'-6"
H-4	Chlorine	4	0	1		Wall	Bolts	5'-6"

## 3.04 IDENTIFICATION LABELS

## A. Pipe Labels:

1. Locate at connections to equipment, valves, or branching fittings at wall boundaries.
2. At intervals along piping not greater than 18 feet on center with at least one label applied to each exposed horizontal and vertical run of pipe.
3. At exposed piping not normally in view, such as above suspended ceilings and in closets and cabinets.
4. Supplementary Labels: Provide to Owner those listed on Piping Schedule that do not receive arrows.
5. Apply to pipe after painting in vicinity is complete, or as approved by Engineer.
6. Install in accordance with manufacturer's instructions.

## B. Equipment Labels:

1. Locate and install on equipment or concrete equipment base.
2. Anchor to equipment or base for easy removal and replacement with ordinary hand tools.

## 3.05 SUPPLEMENTS

## A. The supplement listed below, following "End of Section," is a part of this Specification.

1. Sign Schedule: Tabulation of characteristics and mounting information for warning, informational and unlighted exit signs on Project. Provide items as scheduled. Meet requirements of Occupational Safety and Health Act (OSHA).

**END OF SECTION**

**Mobile Area Water and Sewer System  
C.C. Williams WWTP  
SIGNAGE SCHEDULE**

SIGN								MOUNTING			LETTERING					OTHER REQUIRE MENTS
LOCATION	Q T Y	MARK	TYPE	FORMAT	MAX. SIZE		COLOR	LOCATION	METHOD	HEIGHT TO CENTER LINE	HGT.	STYLE	COLOR	MESSAGE	FACES	
					WIDTH	HEIGHT										
ADJACENT FILL STATION	1	S1	A	By approved submittal	24"	36"	WHITE BACKG ROUND	WALL	TYPE 304 SST FASTENERS	3'-6"	1"	HELVETICA	BLACK	SEE PARAGRAPH 2.07	1	
020 DEWATERING BUILDING	2	S2	A	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	ELECTRICAL ROOM	1	
020 DEWATERING BUILDING	1	S3	A	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	MECHANICAL ROOM	1	
020 DEWATERING BUILDING	1	S4	A	By approved submittal	5.5"	5.5"	TBS	DOOR	BOLTS/ SCREW	5'-0"	1"	HELVETICA	WHITE	TRAINING ROOM	1	
020 DEWATERING BUILDING	1	S5	A	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	SERVER ROOM	1	
020 DEWATERING BUILDING	1	S6	A	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	JANITOR CLOSET (W/BRAILLE)	1	

**Mobile Area Water and Sewer System  
C.C. Williams WWTP  
SIGNAGE SCHEDULE**

SIGN								MOUNTING			LETTERING					OTHER REQUIRE MENTS
LOCATION	Q T Y	MARK	TYPE	FORMAT	MAX. SIZE		COLOR	LOCATION	METHOD	HEIGHT TO CENTER LINE	HGT.	STYLE	COLOR	MESSAGE	FACES	
					WIDTH	HEIGHT										
020 DEWATERING BUILDING	1	S7	A	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	WOMEN TOILET (GRAPHIC SYMBOL W/ WORD TOILET)	1	
020 DEWATERING BUILDING	1	S8	A	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	MEN TOILET (GRAPHIC SYMBOL W/ WORD TOILET)	1	
020 DEWATERING BUILDING	1	S9	A	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	UNISEX TOILET (GRAPHIC SYMBOL W/ WORD TOILET)	1	
020 DEWATERING BUILDING	1	S10	A	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	BREAKROOM	1	
020 DEWATERING BUILDING	1	S11	A-1	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	OFFICE	1	
020 DEWATERING BUILDING	1	S12	A	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	POLYMER ROOM	1	



**Mobile Area Water and Sewer System  
C.C. Williams WWTP  
SIGNAGE SCHEDULE**

SIGN								MOUNTING			LETTERING						OTHER REQUIREMENTS
LOCATION	QTY	MARK	TYPE	FORMAT	MAX. SIZE		COLOR	LOCATION	METHOD	HEIGHT TO CENTER LINE	HGT.	STYLE	COLOR	MESSAGE	FACES		
					WIDTH	HEIGHT											
020 DEWATERING BUILDING	1	S13	A	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	PROCESS	1		
050 CHLORINE & SO2 STORAGE BUILDING	1	S14	A	By approved submittal	8"	8"	TBS	DOOR	BOLTS/ SCREW	5'-0"	1"	HELVETICA	WHITE	MECHANICAL / ELECTRICAL ROOM			
050 CHLORINE & SO2 STORAGE BUILDING	1	S15	A	By approved submittal	5.5"	5.5"	TBS	DOOR	PERMANENT TAPE	5'-0"	1"	HELVETICA	BLACK	UNISEX TOILET (GRAPHIC SYMBOL W/ WORD TOILET)			
050 CHLORINE & SO2 STORAGE BUILDING	1	S16	B	By approved submittal	8"	8"	TBS	DOOR	BOLTS/ SCREW	5'-0"	1"	HELVETICA	WHITE	CHLORINE FEED ROOM	1		
050 CHLORINE & SO 2 STORAGE BUILDING	1	S17	B	By approved submittal	8"	8"	TBS	DOOR	BOLTS/ SCREW	5'-0"	1"	HELVETICA	WHITE	CHLORINE STORAGE ROOM	1		

Mobile Area Water and Sewer System C.C. Williams WWTP SIGNAGE SCHEDULE																	
SIGN								MOUNTING			LETTERING						OTHER REQUIRE MENTS
LOCATION	Q T Y	MARK	TYPE	FORMAT	MAX. SIZE		COLOR	LOCATION	METHOD	HEIGHT TO CENTER LINE	HGT.	STYLE	COLOR	MESSAGE	FACES		
					WIDTH	HEIGHT											
050 CHLORINE & SO2 STORAGE BUILDING	1	S18	B	By approved submittal	8"	8"	TBS	DOOR	BOLTS/ SCREW	5'-0"	1"	HELVETICA	WHITE	SO2 FEED ROOM	1		
050 CHLORINE & SO 2 STORAGE BUILDING	1	S19	B	By approved submittal	8"	8"	TBS	DOOR	BOLTS/ SCREW	5'-0"	1"	HELVETICA	WHITE	SO2 STORAGE ROOM	1		
Entrance Signage	1	See Dwgs.	G	By approved submittal	See Architec- tural Drawing	See Architec- tural Drawing	See Architec- tural Drawing	See Architec- tural Drawing	BOLTS/ SCREW	AS DIRECTE D	1"	HELVETICA	WHITE	1			
See Architectural																	

**SECTION 10 21 00  
COMPARTMENTS AND CUBICLES**

**PART 1      GENERAL**

**1.01      SUMMARY**

- A.    This section includes solid polymer units as follows:
1.    Urinal Screens: Wall hung.
  2.    Toilet Enclosures: Overhead braced and floor anchored.

**1.02      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    American National Standards Institute (ANSI):
    - a.    A117.1, Accessible and Usable Buildings and Facilities.
    - b.    Z124.2, Plastic Shower Receptors and Shower Stalls.
  2.    Americans with Disabilities Act (ADA).
  3.    ASTM International (ASTM):
    - a.    A276, Specification for Stainless Steel Bars and Shapes.
    - b.    A591/A591M, Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Weight (Mass) Applications.
    - c.    A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
    - d.    A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
    - e.    B221/B221M, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
    - f.    F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
    - g.    F594, Specification for Stainless Steel Nuts.
  4.    Code of Federal Regulations (CFR): 40 CFR 59, National Volatile Organic Compound Emission Standards for Consumer and Commercial Products.
  5.    Federal Specifications, Standards and Commercial Item Descriptions, (FS): A-A-60003, Partitions, Toilet, Complete.

### 1.03 SUBMITTALS

#### A. Action Submittals:

1. Shop Drawings: Include plans, sections, elevations, material descriptions, dimensions, and attachments to other work.
  - a. Show locations of cutouts for compartment-mounted grab bars.
  - b. Show locations of reinforcements and attachments for compartment-mounted toilet accessories.
  - c. Product Data: Manufacturer's detailed technical data for toilet compartments and urinal screens specified. Include details of anchors, hardware, and fastenings.
  - d. Anchorage and bracing drawings and/or catalog information, as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements.
2. Samples for Initial Selection: For each type of unit indicated.
3. Samples for Verification: Of each type of color and finish required for units, prepared on a 6-inch by 6-inch square sample of same thickness and material indicated for the Work.

### 1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced installer who has 5 years' experience with projects completed in phenolic-core compartment installations similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to this Project with a minimum of 5 years' experience in similar sized projects.

### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project Site in undamaged condition.
- B. Store and handle phenolic-core and related materials to prevent deterioration or damage as a result of moisture, temperature changes, contaminants, corrosion, breakage, chipping, or warping.
- C. Stack or brace phenolic-core on edge on leveled and adequate A-frames in a manner that prevents undue stresses causing chipping, cracking, and breaking.

## **PART 2      PRODUCTS**

### **2.01      SOLID POLYMER UNITS**

- A. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1-inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
  - 1. Color and Pattern: One color and pattern in each room as selected by Engineer from manufacturer's full range of colors and patterns.
- B. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; polymer or stainless steel.
- C. Polymer Color and Pattern: Matching pilaster.
- D. Brackets Fittings: Stirrup Type: Ear or U-brackets, chrome-plated, nonferrous, cast zinc alloy (zamac) or clear anodized aluminum.
- E. Full-Height (Continuous) Type: Manufacturer's standard design; polymer or extruded aluminum.
  - 1. Polymer Color and Pattern: Matching pilaster.
- F. Manufacturers:
  - 1. Bradley Corporation; Mills Partitions.
  - 2. Capitol Partitions, Inc.
  - 3. Comtec Industries.
  - 4. General Partitions Mfg. Corp.
  - 5. Santana Products, Inc.

### **2.02      ACCESSORIES**

- A. Dowels: Provide 1/4-inch (6.4-mm) diameter dowels fabricated from Type 304 stainless steel, ASTM A276.
- B. Fittings: Cast stainless steel, angle type fittings, with 1-3/4-inch by 1-3/4-inch (44.5-mm by 44.5-mm) legs, 1-1/4 inches (32 mm) long, and capable of supporting compartment components in configuration indicated.

- C. Exposed Anchors and Fasteners: #4 Brushed Stainless Steel fasteners with theft-resistant-type heads. Provide sex-type through bolts with theft-resistant spanner heads and threaded brass rods for attachments to stone.
- D. Bolts, Nuts, and Washers: Provide Type 304 stainless steel bolts complying with ASTM F593, nuts complying with ASTM F594, and washers and lock washers for connection to overhead support as indicated.

## 2.03 FABRICATION

- A. General:
  - 1. Provide standard doors, panels, screens, and pilasters fabricated for compartment system.
  - 2. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.
  - 3. Provide internal reinforcement in metal units for compartment-mounted hardware, accessories, and grab bars, as indicated.
- B. Wall-Hung Screens: Provide units in sizes indicated of same construction and finish as compartment panels, unless otherwise indicated.
- C. Doors: Unless otherwise indicated, provide 24-inch (610-mm) wide in-swinging doors for standard toilet compartments and 36-inch (914-mm) wide out-swinging doors with a minimum 32-inch (813-mm) wide clear opening for compartments indicated to be handicapped accessible.
  - 1. Hinges: Manufacturer's self-closing piano type that can be adjusted to hold door open at any angle up to 90 degrees.
  - 2. Latch and Keeper: Recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. At compartments indicated to be handicapped accessible, provide units that comply with accessibility requirements of authorities having jurisdiction.
  - 3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper; sized to prevent door from hitting compartment-mounted accessories.
  - 4. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.
  - 5. Door Pull: At out-swinging doors, manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

## **PART 3      EXECUTION**

### **3.01      EXAMINATION**

- A.    Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of Work.
- B.    Proceed with installation only after unsatisfactory conditions have been corrected.
- C.    Coordinate layout and installation of supports, inserts, and anchors built into other units of work for toilet compartment anchorage.
- D.    Coordinate toilet stall required reinforcing, openings for toilet accessories and grab bars.

### **3.02      INSTALLATION**

- A.    General:
  - 1.    Comply with manufacturer's written installation instructions.
  - 2.    Install units rigid, straight, level, and plumb.
  - 3.    Secure units in position with manufacturer's recommended anchoring devices.
  - 4.    Maximum Clearances:
    - a.    Pilasters and Panels: 1/2 inch (13 mm).
    - b.    Panels and Walls: 1 inch (25 mm).
  - 5.    Stirrup Brackets: Secure panels to walls and to pilasters with not less than three brackets attached at midpoint and near top and bottom of panel.
    - a.    Locate wall brackets so holds for wall anchors occur in masonry or tile joints.
    - b.    Align brackets at pilasters with brackets at walls.
- B.    Floor-Anchored Units:
  - 1.    Set pilasters with anchors penetrating not less than 2 inches (50 mm) into structural floor, unless otherwise indicated in manufacturer's written instructions.
  - 2.    Level, plumb, and tighten pilasters.
  - 3.    Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.

C. Wall-Hung Urinal Screens:

1. Attach with anchoring devices to suit supporting structure.
2. Set units level and plumb and to resist lateral impact.

3.03 ADJUSTING AND CLEANING

- A. Adjust and lubricate hardware for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return to fully closed position.
- B. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

**END OF SECTION**



**SECTION 10 28 00  
TOILET AND BATH ACCESSORIES**

**PART 1 GENERAL**

**1.01 REFERENCES**

- A. The following is a list of standards which may be referenced in this section:
  - 1. National Fire Protection Association (NFPA): 701, Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

**1.02 DESIGN REQUIREMENTS**

- A. Design grab bars, shower seats, dressing room bench seats and attachments to resist minimum 250-pound concentrated load applied at any point in any direction.

**1.03 SUBMITTALS**

- A. Action Submittals:
  - 1. Shop Drawings:
    - a. Manufacturer's literature clearly indicating:
      - 1) Architect's identification mark, size, and description of components.
      - 2) Base material with surface finish inside and out.
      - 3) Hardware and locks and attachment devices.
      - 4) Description of rough-in framing.
      - 5) Manufacturer's cut sheets
      - 6) Details of blocking and anchorage required.
- B. Informational Submittals:
  - 1. Distributor's List: List of local distributors for supplies required for accessories installed.
  - 2. Cleaning instructions.

**1.04 QUALITY ASSURANCE**

- A. Flame Resistant Fabric: Passes when tested in accordance with NFPA 701, Test 1 or Test 2.
- B. Recycled Content Materials: Furnish materials with recycled content.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

A. Materials and products specified in this section shall be products of:

1. Bobrick Washroom Equipment, Inc.
2. Bradley Corp.
3. Accessory Specialties, Inc.
4. Watrous, Inc.

**2.02 TOILET AND BATH ACCESSORIES**

A. Furnish accessory items listed where indicated by mark or note on Drawings.

<b>Item</b>	<b>Mark</b>	<b>Bobrick</b>	<b>Bradley</b>
Surf. Mounted Dual Roll Toilet Paper Dispenser	TPD-1	No. B-2740	No. 5241-50
Wall Mounted Liquid Soap Dispenser	SD-2	No. B-4112	No. 6542
Mirror, Size on Dwgs	MIR	No. B-290	No. 780
Surf. Mounted Paper Towel Dispenser	PTD-1	No. B-72860	No. 2495
Surf. Mounted Napkin Disposal	ND	No. B-270	No. 4781-15
Mop and Broom Holder (24")	M&BH	No. B-223 x 24	No. 9953
Robe Hook	RH	No. B-6727	No. 9124
Grab Bars (straight) (36")	GB-1	No. B-6806-36	No. 812-001-36
Grab Bars (straight) (42")	GB-2	No. B-6806-42	No. 812-001-42
Grab Bars (shower, corner type)	GB-6	No. B-6861	No. 812-036/037 Modified (15"x30")
Fold-Up Dressing Room Bench, Phenolic Top. Top Color: TBS	BCH-1	<u>Bobrick</u> B-5193	
Recessed Soap Dish	SD	No. B-439/4390	No. 940/9402
Shower Curtain Rod	SCR	No. B-207	No. 9538

Item	Mark	Bobrick	Bradley
Flame Resistant and Antibacterial Shower Curtain with Hooks	SC	No. B-204-2/204-1	No. 9537/9536
Fold-Up Shower Seat (L-shaped)	SHS	No. B-518/517	No. 956/9561
Towel Pin	TP	No. B-6777	No. 9314

- B. Finish:
1. Satin stainless steel.
  2. Manufacturer's or brand name on face of units is not acceptable.
- C. Anchors: Furnish anchors, fasteners, or other devices necessary for a complete, secure installation.
1. Fasteners: Tamper-proof screws or bolts.
- D. Supplies: Furnish fill supplies, such as paper goods, soap, and napkins, as recommended by accessory manufacturer.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Coordinate support framing and backing as necessary for proper installation of accessories.
- B. Coordinate the Work with placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

#### **3.02 INSTALLATION**

- A. Mounting Heights and Locations: Locate where mark is shown on Drawings at height required by accessibility regulations.
- B. Follow manufacturer's instruction and recommendations.
- C. Install and securely anchor accessories in their proper locations, plumb and level, and without distortion.
- D. Remove protective masking and clean surfaces, leaving them free of soil and imperfections.

C.C. Williams WWTP Dewatering

- E. Fill units with necessary supplies within 10 days before Substantial Completion.
- F. Deliver to Owner keys and devices required to fill and service units.

3.03 CLEANING

- A. Clean and repair existing toilet accessories which remain or are to be reinstalled.

**END OF SECTION**

**SECTION 10 44 00**  
**FIRE PROTECTION SPECIALTIES AND SAFETY EQUIPMENT**

**PART 1 GENERAL**

**1.01 REFERENCES**

A. The following is a list of standards which may be referenced in this section:

1. Factory Mutual (FM).
2. Mine Safety and Health Administration (MSHA).
3. National Fire Protection Association (NFPA):
  - a. 10, Standard for Portable Fire Extinguishers.
  - b. 30, Flammable and Combustible Liquids Code.
4. National Institute for Occupational Safety and Health (NIOSH).
5. Occupational Safety and Health Administration (OSHA).
6. Underwriters Laboratories Inc. (UL): Fire Protection Equipment Directory.

**1.02 PERFORMANCE REQUIREMENTS**

- A. Conform to NFPA 10.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.
- C. Provide fire rated fire extinguisher cabinets classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.
- D. Provide key boxes as required by the applicable code or by the fire marshal or code official having jurisdiction.

**1.03 SUBMITTALS**

A. Action Submittals:

1. Shop Drawings:
  - a. Fire Extinguishers: Manufacturer's product data for each item, including sizes, ratings, UL listings, or other certifications, and mounting information.
  - b. Extinguisher Cabinets and Key Boxes: Indicate type of cabinet, cabinet physical dimensions, rough-in measurements for recessed and semi-recessed cabinets, wall bracket mounted measurements, location, fire ratings, mounting methods and anchorage details.
  - c. Product Data: Extinguisher operational features, color and finish, and anchorage details.

B. Informational Submittals:

1. Manufacturer's Installation Instructions:
  - a. Special criteria and wall opening coordination requirements.
  - b. Manufacturer's installation details for fire-rated cabinets.
  - c. Cabinet location plan.
2. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
3. Operation and Maintenance Data: Submit test, refill or recharge schedules and recertification requirements.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 61 00, Common Product Requirements: Environmental conditions affecting products onsite.
- B. Do not install extinguishers when ambient temperatures are capable of freezing extinguisher ingredients.

**PART 2 PRODUCTS**

2.01 PORTABLE FIRE EXTINGUISHERS

A. Manufacturers:

1. Basis of Design: JL Industries, Cosmopolitan model.
2. Other Manufacturers:
  - a. Larsen's Manufacturing Co.
  - b. Nystrom Products Co.
  - c. Potter Roemer.

B. General:

1. Conform to NFPA 10 for fire extinguishers.
2. Furnish fire extinguishers and cabinets from one manufacturer.
3. UL listed, charged and ready for service.

C. Multipurpose Hand Extinguisher (F. Ext-1):

1. Tri-class dry chemical extinguishing agent.
2. Pressurized, red enameled steel shell cylinder.
3. Activated by top squeeze handle.
4. Agent propelled through hose or opening at top of unit.
5. For use on A, B, and C class fires.
6. Minimum UL Rating: 4A-60B:C, 10-pound capacity.

D. Clean Agent Hand Extinguisher (F. Ext-5):

1. Clean agent with nonozone depleting potential extinguishant.
2. Pressurized, red enameled steel shell cylinder.
3. Activated by top squeeze handle.
4. Colorless, odorless, electrically non-conductive clean agent which discharges as a liquid and flashes to a gas.
5. Environmentally friendly, with zero ozone depletion potential, containing no chlorofluorocarbons, hydrochlorofluorocarbons, or halon.
6. For use on Class A, B, or C fires.
7. Minimum UL Rating: 2A-10B:C, 13-pound capacity.

2.02 FIRE EXTINGUISHER CABINETS

A. Manufacturers:

1. Basis of Design: JL Industries.
2. Other manufacturers:
  - a. Larsen's Manufacturing Co.
  - b. Modern Metal Products.

B. Semi-Recessed Extinguisher Cabinet Type:

1. Semi-recessed.
2. Sized to accommodate accessories.

C. Metal: Formed stainless steel Type 304; 0.036-inch thick base metal.

D. ADA Compliant.

E. Door: 0.016-inch thick, reinforced for flatness, continuous hinge and rigidity; latch access. Frame has 1-3/4-inch trim on face and door. Square edge design.

F. Door Glazing: Glass, clear, 1/8-inch thick, full panel of tempered glass.

G. Cabinet Mounting Hardware: Appropriate to cabinet and wall type.

H. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim and door stiles.

I. Handle is ADAC recess pull handle. Predrill for anchors.

- J. Hinge doors for 180-degree opening with two butt hinges. Furnish roller type catch.
- K. Vertical decal that says "Fire Extinguisher" in red on door.
- L. Weld, fill, and grind components smooth.
- M. Glaze doors with resilient channel gasket glazing.
- N. Finishing Cabinet Exterior Trim and Door: Anodized to color as selected.
- O. Finishing Cabinet Interior: Enamel.
- P. Key Boxes: Select size and options according to authority having jurisdiction requirements. Other companies do make similar products. However, any system adopted by a Fire Department must be compatible from one installation to another. Only one master key will be carried on fire apparatus. This key must operate all lock boxes in the City. To maintain master key security, all companies in this business carefully guard master key codes. They will not release this information to any other manufacturer or supplier. These security concerns require that one supplier be selected for all installations in the City. Mounting height is also important and 6 feet 0 inch is recommended by Knox. However, AHJ should be consulted.

## 2.03 KEY BOXES

- A. Manufacturers and Products:
  - 1. Knox Company, Phoenix, AZ.
  - 2. Kidde Fire Safety; SupraSafe, Mebane, NC.

## 2.04 ACCESSORIES

- A. Extinguisher Brackets: For hand extinguishers not located in cabinets, furnish heavy-duty brackets with clip-together strap for wall mounting formed steel, enamel finish.
- B. Graphic Identification: Provide graphic identification marking for each fire extinguisher type. OSHA approved pictorial markings to indicate the extinguisher uses and nonuses on a single label.
- C. Fasteners: Furnish necessary screws, bolts, brackets, and other fastenings of suitable type and size to secure items of fire and safety equipment in position.
  - 1. Metal expansion shields for machine screws at concrete and masonry.
  - 2. Interior: Rust-resistant.
  - 3. Exterior: Stainless steel.



## **PART 3      EXECUTION**

### **3.01      EXAMINATION**

- A.    Verify cabinets are correctly sized for fire extinguisher type.
- B.    Verify rough openings for cabinet are correctly sized and located.

### **3.02      INSTALLATION**

- A.    Install where indicated or directed and in accordance with manufacturer's recommendations.
- B.    Install cabinets plumb and level in wall openings, maximum 48 inches from finished floor to top of extinguisher handle.
- C.    Secure cabinets and brackets rigidly to structure.
- D.    Provide adequate backing for mounting surfaces.
- E.    Place extinguishers in cabinets on wall brackets.
- F.    Position cabinet signage as required by authorities having jurisdiction.
- G.    Safety Chart: For each breathing apparatus, provide wall chart containing instructions for use and recommendations for safe handling of chlorine containers, emergency procedures, and applicable principles of first-aid.

### **3.03      PORTABLE FIRE EXTINGUISHERS AND CABINETS**

- A.    Provide at locations shown or as directed by Engineer.
- B.    Mount hangers securely in position, following manufacturer's recommendations.
- C.    Top of Extinguisher: No more than 54 inches above floor.
- D.    Install wall brackets, maximum 48 inches from finished floor to top of extinguisher handle.
- E.    Fire-Rated Cabinets: Install in accordance with cabinet manufacturer's requirements. Maintain integrity of wall fire-rating.

3.04 WELDING SCREENS

- A. Assemble following manufacturer's instructions and locate where shown on Drawings or as directed by Engineer.

**END OF SECTION**

**SECTION 10 51 00  
LOCKERS AND BENCHES**

**PART 1      GENERAL**

**1.01      SUBMITTALS**

**A.      Action Submittals:**

1.      Shop Drawings: Anchorage and bracing drawings and/or catalog information, as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements.
2.      Manufacturer's literature describing products proposed for use.
3.      Color samples minimum 2-inch by 2-inch of all colors available.

**B.      Informational Submittals:**

1.      Anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements. Submit with Action Submittal for the same item.
2.      Installation instructions.

**1.02      QUALITY ASSURANCE**

- A.      Manufacturer Qualifications:** A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.
- B.      Installer Qualifications:** A company regularly engaged in installation of products specified in this section, with a minimum of 5 years' experience.

**1.03      DELIVERY, STORAGE, AND HANDLING**

- A.      Store products in manufacturer's unopened packaging until ready for installation.**
- B.      Locker components shall be stored flat until assembly. All finishes shall be protected from soiling and damage during handling.**

**1.04      PROJECT CONDITIONS**

- A.      Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.**

## **PART 2      PRODUCTS**

### **2.01      LOCKERS**

#### **A.      Manufacturers:**

1.      ASI Storage Solutions, Inc.
2.      Lyon Workspace Products.
3.      Penco Products, Inc.
4.      Republic Storage Systems Company.
5.      DeBourgh Mfg. Co.

### **2.02      LOCKERS**

#### **A.      Type: Standard, single-tier, single-door type made of solid plastic.**

1.      Locker Sides, Backs, Tops, Bottoms, Shelves, Doors, and Frames: High-impact, high-density polyethylene (HDPE) formed under pressure into solid plastic components, 3/8-inch thick minimum, with homogenous color throughout.

#### **B.      Size: 15 inches by 18 inches.**

#### **C.      Top: Flat.**

#### **D.      Bottom: 4-inch high solid plastic.**

#### **E.      Doors: Standard, with louvers top and bottom.**

#### **F.      Hinges and Door Strikes: Manufacturer's standard continuous type.**

#### **G.      Locks: Built-in key lock; furnish key for each locker.**

#### **H.      Shelves: One hat shelf.**

#### **I.      Coat Hooks: Two double-prong wall hooks in each compartment.**

#### **J.      Number Plates: Noncorrosive with black numerals, numbered consecutively beginning with one in each room.**

#### **K.      Finish: Manufacturer's standard smooth matte or orange-peel finish.**

#### **L.      Color: To Be selected by Architect.**

#### **M.      Manufacturers:**

1.      Comtec Industries.
2.      Santana Plastic Products.

## 2.03 NON-ADA AND ADA BENCHES

### A. NON-ADA Benches

1. Backrest and Tops:
  - a. High-density polyethylene (HDPE) formed under pressure into single component section, with homogenous color throughout.
  - b. 9-1/2 inches wide by minimum 1-1/2 inches thick by lengths shown on Drawings.
  - c. Manufacturer's standard plastic sealer finish.

### B. ADA Benches

1. Backrest and Tops:
  - a. High-density polyethylene (HDPE) formed under pressure into single component section, with homogenous color throughout.
  - b. 24 inches wide by minimum 1-1/2 inches thick by lengths shown on Drawings, but minimum 42 inches long.
  - c. Manufacturer's standard plastic sealer finish.

### C. Aluminum Pedestals:

1. Aluminum.
2. Heavy-duty tubes welded to top and bottom flanges.
3. 16 inches high, minimum.
4. Floor anchored. Anchor bolts minimum 1/2-inch diameter (unless a larger minimum size is shown on the Drawings) Type 316 stainless steel; tamper resistant Torx head screws and secured to floor using lead expansion shields with 2-inch stainless steel Philips head machine bolts. Total number and final size as required by equipment manufacturer and by Contractor's anchorage and bracing design per Section 01 88 15, Anchorage and Bracing.
5. Spacing as recommended by manufacturer, but not to exceed 3 feet on center.
6. Finish and Color: Manufacturer's standard finish and color as selected by Owner or Architect.

### D. Manufacturers:

1. Basis of Design: Tuftec.
2. Other manufacturers:
  - a. Comtec Industries.
  - b. Santana Plastic Products.

### **PART 3      EXECUTION**

#### **3.01      LOCKER INSTALLATION**

- A.    Securely attach to wall, base, and to each other as recommended by manufacturer. Accurately place anchor bolts using templates furnished by equipment manufacturer and as specified in Section 05 50 00, Metal Fabrications.
- B.    Align and level lockers with shims where necessary to compensate for irregularities in the base.
- C.    Install trim, adjust doors and latches for proper operation, and leave lockers level, plumb, neat, rigid, and free from soil and imperfections.

#### **3.02      BENCH INSTALLATION**

- A.    Attach pedestals to top with fasteners supplied by manufacturer and secure to floor with anchors recommended by manufacturer. Accurately place anchor bolts using templates furnished by equipment manufacturer and as specified in Section 05 50 00, Metal Fabrications.
- B.    ADA benches must be installed against a full height wall.

### **END OF SECTION**

**SECTION 10 73 00  
PROTECTIVE COVER**

**PART 1      GENERAL**

**1.01      SECTION INCLUDES**

- A.    Sidewalk Canopy.
- B.    Man door and window wall canopies for the following buildings:
  - 1.    Dewatering Building.
  - 2.    Chlorine and SO<sub>2</sub> Storage Building.

**1.02      REFERENCES**

- A.    American Architectural Manufacturers Association (AAMA):
  - 1.    AAMA 603, Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.
  - 2.    AAMA 605, Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
  - 3.    AAMA 607.1, Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
  - 4.    AAMA 608.1, Voluntary Guide Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
- B.    The Aluminum Association (AA): The Aluminum Design Manual 2010, Specifications and Guidelines for Aluminum Structures.
- C.    American Society of Civil Engineers (ASCE): ASCE 7-16, Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
- D.    American Society for Testing and Materials (ASTM):
  - 1.    ASTM B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 2.    ASTM B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 3.    ASTM C150, Specification for Portland Cement.
  - 4.    ASTM C504, Specification for Aggregates for Masonry Grout.

- E. American Welding Society (AWS): ANSI/AWS D1.2, Structural Welding Code – Aluminum.
- F. International Building Code 2012 through 2018.
- G. General Structural Notes on Drawings.

#### 1.03 DESIGN REQUIREMENTS

##### A. Sidewalk Canopy:

1. Design and install cast-in-place concrete foundation structure for the aluminum canopy and concrete sidewalk structure to meet the requirements of the 2018 International Building Code (IBC).
2. Aluminum protective cover shall be mechanically fastened using internally welded brackets and concealed stainless steel fasteners. Welded connections can be used if shipping allows.
3. Canopy, where shown on Drawings, shall use perimeter extruded gutter and extruded decking running perpendicular to length of sidewalk. Beams are to be notched to receive the extruded gutter to allow decking to sit flush to the top of the beam. Extruded decking shall be a roll-locked design where the extruded cap and pan shall interlock to make a rigid structure. Crimped decking is not allowed. Roll formed decking shall be allowed upon approval by the Architect.
4. False fascia and extruded decking running parallel to length of sidewalk will be allowed if canopy spans exceed limitations of perpendicular decking and perimeter gutter. If used, pans are to be welded at ends to prevent water leakage. Standard T-flashing shall be used where decking is separated at a drain beam. The false fascia is to be secured using a rivet every 4 feet-0 inch on-center connecting the fascia to the edge pans. Tie back straps are to be installed connecting the top of the fascia to the decking at 4 feet-0 inch on-center.
5. Canopy shall drain from the decking to the perimeter gutter, into the drain beam (if applicable) and discharge at the bottom of the column.
6. Deflector plates are to be installed at the bottom of the column to discharge the water away from the column. The deflector plates are to be caulked inside the column and fastened to the column using a single rivet.
7. Columns are to be grouted into concrete foundation.
8. Design calculations and Drawings shall be signed and sealed by a registered professional engineer, licensed in the State of Alabama.



B. Man Door and Window Wall Canopies:

1. Aluminum protective cover shall be mechanically fastened using roll-formed aluminum overhead hanger rod style canopies. Basis of design: Manufacturer Peachtree Protective Covers.
2. Roof flashing to be continuous reglet aluminum flashing from precast concrete to top of canopy as recommended and supplied by to meet field conditions of installation.
3. Water drainage to be designed in rear of canopy with wall mounted matching aluminum downspout.
4. Decking shall consist of an interlocking roll form 2-1/2 W style pan in .040-inch aluminum.
5. Intermediate framing members shall be extruded aluminum alloy 6063-T6 in profile and thickness as required.
6. Hangar rods and attachment hardware will be in standard finish.
7. Fascia shall be standard extruded 8-inch J style or as shown on the Drawings.
8. Connections shall be mechanically assembled using 3/16 fasteners with a minimum shear stress of 350 pounds. Pre-welded and factory welded connections are not acceptable.
9. Decking shall be designed with interlocking roll-formed aluminum members.
10. Water shall drain from covered surfaces into intermediate trough and be directed to downspout from rear gutter.
11. Structural Framing:
  - a. Heli-arc welded, one-piece rigid bents.
  - b. Mechanically fastened bents using internally concealed bolted connections.
  - c. Window Wall covering structure to match the profile shown on the Drawings.

C. Structural Design: Prepare complete structural design calculations for canopy members including verification and modification, if required, of shown foundation.

D. Design calculations shall be signed and sealed by a registered professional engineer, licensed in the Alabama.

1.04 SUBMITTALS

A. Product Data: Manufacturer's catalog data, detail sheets, and Specifications.

B. Shop Drawings: Calculations layout and erection drawings showing roof framing, deck panels, cross sections, and trim details, clearly indicating proper assembly and signed, dated, and sealed by a Alabama professional engineer.

C. Quality Assurance/Control Submittals:

1. Qualifications: Letter certifying manufacturer/fabricator and Installer's experience as required signifying qualifications.
2. Structural design calculations.
3. Manufacturer's Installation Instructions.

1.05 QUALITY ASSURANCE

- A. Overall Standard: Structural engineering design documents stamped by a structural engineer registered to practice in the State of Alabama.
- B. Manufacturer Qualifications: Minimum 10 years' experience in producing canopies with welded bents and of the type specified.
- C. Installer Qualifications: Minimum 2 years' experience in erecting covers/canopies of the type specified. Installed by manufacturer, third party installation is not acceptable.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Follow manufacturer's instructions.

**PART 2 PRODUCTS**

2.01 MANUFACTURERS

- A. Perfection Architectural Systems Inc.
- B. Mitchell Metals.
- C. Peachtree Protective Covers.
- D. Dittmer Architectural Aluminum.
- E. Or approved equal.
- F. Provide all protective covers from a single manufacturer.

2.02 MATERIALS

- A. Aluminum Extrusions: 6063 alloy, T-6 temper, ASTM B221.
- B. Grout: One part Portland cement (ASTM C150, Type I), three parts masonry sand, add water (potable) to produce a pouring consistency; 2,000 pounds per square inch (13.8 MPa) compressive strength, minimum.

- C. Fasteners: Aluminum, 18-8 stainless steel, or 300 series stainless steel.
- D. Protective Coating for Aluminum Columns Embedded in Concrete: Clear acrylic.
- E. Gaskets: Dry seal santoprene pressure type.
- F. Aluminum Flashing: ASTM B209, Type 3003 H14, 0.040 inch, minimum.

## 2.03 COMPONENTS

- A. Beams:
  - 1. Aluminum tubular extrusions designed to receive deck members in self-flashing manner.
  - 2. Size: As required by structural engineering design.
- B. Deck: Rigid-Roll-Lock extruded aluminum, self-flashing, interlocking sections.
  - 1. Size and Profile: As required by structural engineering design.
  - 2. Provide welded endplate water dams where sections terminate at other than drainage channels.
- C. Fascia: Manufacturer's standard extruded aluminum fascia sections as shown on drawings and as required to complete the installation resulting in a neat finished appearance. Locate splices where continuous runs of fascia are jointed. Locate splices to be in line with bents and fasten in place on hidden or non-vertical surfaces.
  - 1. Include manufacturer's standard extruded aluminum gutters for suspended canopies.
- D. Flashing: Aluminum sheet, thickness as recommended by manufacturer for specific condition.
- E. Factory Finishing: Fluoropolymer Coating: 70 percent PVDF resin based fluoropolymer, AA-C-12C-42R-1. Color to be selected by architect shall comply with AAMA 605.
  - 1. Three coat application.

## 2.04 ACCESSORIES

### A. Fasteners:

1. Deck Screws: No. 14 by 1-inch (25 mm), self-tapping, Type 18-8 stainless steel with neoprene washers.
2. Trim Screws: No. 10 by 1/2-inch (13 mm), self-tapping, Type 18-8 stainless steel.
3. Trim Rivets: Aluminum, size recommended by manufacturer for specific condition.
4. Other Fasteners: Type 18-8 stainless steel, type recommended by manufacturer for specific condition.

## 2.05 FABRICATION

- ### A. General: Provide supports, anchorages, and accessories required for complete assembly.

## **PART 3 EXECUTION**

### 3.01 EXAMINATION

- #### A. Examine footings in which bents will be set. Verify footing locations and elevations comply with Shop Drawings.
- #### B. Coordinate with responsible trade to perform corrective work on unsatisfactory footings or surfaces.
- #### C. Commencement of work by installer is acceptance of existing conditions.

### 3.02 ERECTION

- #### A. Erect protective covers in accordance with manufacturer's installation instructions.
- #### B. Set bents plumb, straight, and true to line, adequately braced to maintain position until grout has cured.
- #### C. Keep aluminum surfaces from direct contact with ferrous metal, cementitious materials, or other incompatible materials by applying one coat of zinc chromate primer; follow with two coats of aluminum paint.
1. In lieu of aluminum paint, one coat of high-build bituminous paint applied to 1/16-inch (1.6 mm) thickness may be used.
  2. Use stainless steel connectors with nylon washers.

3.03 CLEANING

- A. Clean surfaces soiled by work as recommended by manufacturer.
- B. Remove surplus materials and debris from the Site.

3.04 PROTECTION

- A. Protect finished aluminum surfaces from damage due to subsequent construction operations.

**END OF SECTION**



**SECTION 10 80 00  
MISCELLANEOUS SPECIALTIES**

**PART 1      GENERAL**

**1.01      SUMMARY**

- A.    Section includes:
1.    Writing board.
  2.    Tackboard.

**1.02      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    ASTM International (ASTM): D1187, Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
  2.    UL (UL): Building Materials Directory.

**1.03      SUBMITTALS**

- A.    Action Submittals:
1.    Manufacturers' product data for proposed items. Clearly identify each item.
  2.    Manufacturers' color charts.
  3.    Anchorage and bracing drawings and/or catalog information, as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements.
- B.    Informational Submittals:
1.    Manufacturers' installation instructions.
  2.    Manufacturers' cleaning and service instructions for proposed items.
  3.    Anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements. Submit with Action Submittal for the same item.

## **PART 2      PRODUCTS**

### **2.01      WRITING BOARDS**

- A.    Materials: Stretcher level sheet steel facing, 24-gauge minimum, bonderized and surfaced to accept watercolor and semipermanent writing inks with selective erasability, minimum 3/8-inch particleboard core, 0.015-inch aluminum backing sheet, extruded aluminum frame and tray.
- B.    Composition: Facing sheet and backing sheet bonded to opposite sides of core.
- C.    Finish and Color: White porcelain enamel semigloss writing surface finish impervious to cracking, checking, chipping, and peeling; clear anodized finish on extruded aluminum frame and tray.
- D.    Size:
  - 1.    Training Room: Two, 5 Feet by 12 Feet.
  - 2.    Control Room: One, 4 Feet by 10 Feet.
  - 3.    Break Room: One, 4 Feet by 6 Feet
- E.    Accessories: Twelve watercolor markers, six black and six assorted colors compatible with writing surface; cleaners, towels, magnetic strips, and instruction booklet.
- F.    Manufacturers and Products:
  - 1.    AARCO Products, Inc., Yaphank, NY; Series 10-120 and 10-008.
  - 2.    Claridge Products & Equipment, Inc., Harrison, AR; Series 4, Type A.
  - 3.    Lemco, Inc., West Jordan, UT; Type 3, No. 250.

### **2.02      ENCLOSED TACKBOARD WITH ALUMINUM FRAME**

- A.    Materials: 1/4-inch vinyl-impregnated cork; 1/4-inch tempered hardboard backing; extruded aluminum frame without tray.
- B.    Composition: Cork face sheet, factory cemented to backing.
- C.    Finish and Color:
  - 1.    Cork Surface Color and Texture: Natural; clear anodized finish on extruded aluminum frame.



- D. Size:
  - 1. Break Room: One, 3 feet by 6 feet.
- E. Accessories: Clip angle hangers at 24 inches on center top and bottom.
- F. Aluminum frame with shatter proof acrylic doors.
- G. Manufacturers and Products:
  - 1. ULINE; H-3060.
  - 2. Or equal.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION OF SPECIALTIES**

- A. Follow manufacturer's recommendations and printed instructions. Consult with Engineer in order that minor adjustments in locations can be decided if necessary.
  - 1. Install materials plumb or level as applicable and attach securely to adjacent materials with suitable fasteners.
  - 2. Prevent scratching or damaging adjacent materials during installation.
  - 3. Apply isolation paint to specialty item where metal comes in contact with dissimilar metal or is in contact with concrete or soil.

#### **END OF SECTION**



**SECTION 12 35 53**  
**LABORATORY CASEWORK**

**PART 1      GENERAL**

**1.01      REFERENCES**

- A.    The following is a list of standards which may be referenced in this section:
1.    American National Standards Institute (ANSI):
    - a.    A135.4, Basic Hardboard.
    - b.    A208.1, Particleboard, Mat-Formed Wood.
    - c.    Z358.1, Emergency Eyewash and Shower Equipment.
  2.    American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE): 110, Method of Testing Performance of Laboratory Fume Hoods.
  3.    Americans with Disabilities Act (ADA).
  4.    APA–The Engineered Wood Association (APA): Grades and Specifications.
  5.    Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada, Woodwork Institute (AWI, AWMAC, WI): Architectural Woodwork Standards.
  6.    ASTM International (ASTM):
    - a.    A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
    - b.    A507, Standard Specification for Drawing Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled.
    - c.    A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
    - d.    C1048, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
    - e.    D1193, Standard Test for Reagent Water.
    - f.    E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
  7.    National Electrical Manufacturer’s Association (NEMA):
    - a.    LD 3, High Pressure Decorative Laminates (HPDL).
    - b.    WD 1, General Color Requirements for Wiring Devices.
  8.    National Institute of Standards and Technology (NIST), Product Standard Section: PS 1, Structural Plywood.
  9.    National Fire Codes–National Fire Protection Association (NFPA):
    - a.    30, Flammable and Combustible Liquids.
    - b.    45, Fire Protection for Laboratories Using Chemicals.

10. Occupational Safety and Health Administration (OSHA): General Industry Standards, Section 1910.106.
11. Scientific Equipment and Furniture Association (SEFA):
  - a. SEFA 1, Recommended Practices For Laboratory Fume Hoods.
  - b. SEFA 2, Recommended Practices For Installations.
  - c. SEFA 8, Recommended Practices For Laboratory Grade Casework.

## 1.02 SUBMITTALS

### A. Action Submittals:

1. Shop Drawings: Completely describe and illustrate design features, materials, fabrication, and casework layout including rough-in details for plumbing, electrical, and ventilation connections.
  - a. Key units to Contract Document designations.
  - b. Provide details and dimensions not controlled by job conditions.
  - c. Show required field measurements beyond manufacturer's control.
  - d. Establish and maintain applicable rough-in and field dimensions.
  - e. Descriptive literature and manufacturer's specifications of casework, hardware, service fixtures, and specialty items.
  - f. Brochures, catalogs, installation instructions, and operations and maintenance manuals.
  - g. Clearly mark with Contract Document designation each proposed item in manufacturer's literature.
  - h. Coordinate Shop Drawings with other trades.
  - i. Anchorage and bracing drawings and/or catalog information, as required by Section 01 88 15, Anchorage and Bracing, for loads provided in Section 01 61 00, Common Product Requirements.
2. Samples:
  - a. Finished color Samples of each finish proposed by casework manufacturer.
  - b. Sample unit, complete with hardware including locks, accessories, and top for Owner's inspection and 1 month's use. Unit, except top, may be used on Project.

## 1.03 QUALITY ASSURANCE

### A. Standards:

1. Casework: Conform to AWI, AWMAC, and WI Architectural Woodwork Standards, Section 10, Premium grade, including laboratory features.

B. Casework Manufacturer Qualifications:

1. Successful completion of comparable work.
2. Minimum 5 years' experience in manufacture of quality and type of laboratory casework and furnishings specified.

C. Installation Services: Install under direct supervision of factory-trained representative of casework manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver materials to Project Site until excessive moisture is out of building for at least 10 days.
- B. Store casework inside in dry and well-ventilated areas, and do not subject to extreme changes in temperature or humidity.
- C. Coordinate delivery and installation with Engineer. Owner may wish to inspect items in Contractor's presence to verify condition.

**PART 2 PRODUCTS**

2.01 CASEWORK MANUFACTURERS

- A. Plastic laminate faced casework of the following manufacturers, meeting these Specifications, may be used on this Project:
1. LSI Corp., Minneapolis, MN.
  2. Nolen Products, Knoxville, TN.
  3. TMI Systems, Dickinson, ND.
  4. Westmark Products, Tacoma, WA.
  5. Institutional Casework, Inc., Paris, TN.
  6. Kewaunee Scientific Corporation, Statesville, NC.
  7. Laboratory Design and Supply, Buford, GA.

2.02 CASEWORK MATERIALS

- A. Plywood: APA exterior type conforming to NIST, Product Standard Section, PS 1.
1. Thickness: Minimum 3/4 inch.
  2. Grade: No knots or voids present on surfaces. Use marine grade for cabinet bases.

B. Chemical-Resistant Plastic Laminate:

1. High-pressure plastic laminate for cabinet surfaces, excluding countertops.
2. Thickness: 0.034 inch plus or minus 0.005 inch.
3. NEMA LD 3, Grade HGP 30 with Grade CLS 20 backing.
4. Chemical Resistance for 16-Hour Contact Period:
  - a. No effect for dilute acids, solvents, bases, indicators, biological stains, and general reagents.
  - b. Only slight change of gloss or color for 48 percent hydrofluoric acid, chromic acid, 85 percent phenol, and 78 percent calcium thiocyanate.
  - c. Only slight damage for 70 percent nitric acid and 96 percent sulfuric acid.
5. Color: Selected by Engineer from manufacturer's standard colors.
6. Manufacturer and Product: Wilsonart; Chemsurf.

C. Edge Banding:

1. Minimum 3-mm-thick polyvinyl chloride.
2. Color: Selected by Engineer from manufacturer's standard colors.

D. Hardware:

1. Hinges: Minimum five-knuckle, hospital tip fixed pin type, dull chrome finish, four screws each leaf into faces; no edge fastening permitted.
2. Pulls: Manufacturer's standard semiflush type of molded ABS plastic in color selected by Engineer from manufacturer's standard colors.
3. Shelf Fasteners: Metal or plastic design providing rigid and true shelf alignment.
  - a. Metal: Dull chrome finish.
  - b. Plastic: Match cabinet interior color.
4. Drawer Slides:
  - a. Metal designed to mate with drawer slides in cabinets.
  - b. Provide smooth sliding action.
  - c. Load Support on Extended Drawer: 200 pounds in file drawers, 75 pounds in drawers 6 inches and less in depth, and 100 pounds in other drawers.

E. Accessories: Manufacturer's standard catches, grommets, and other accessories and trim required to complete installation in secure and rigid manner. Finish to match other exposed hardware.

F. Transparent Doors: Clear tempered float glass, conforming to ASTM C1048, Kind FT, Condition A, Type I, Class 1, glazing quality, 1/4 inch (6 mm) minimum thickness.

G. Adhesives: Manufacturer's standard water-resistant adhesives.

H. Countertops:

1. Epoxy Resin:

- a. Molded, modified, solid epoxy resin.
- b. Formulated to produce smooth, nonabsorbent, chemical-, heat-, and shock-resistant surface.
- c. Homogeneous in color and texture.
- d. Thickness: Minimum 1 inch.
- e. Drip groove under front edge.
- f. Integral two-piece glued backsplash for full length of adjoining walls.
- g. Color: Black or dark gray.
- h. Manufacturers and Products:
  - 1) Durcon; Durcon Resin.
  - 2) Prime Industries, Inc.; Prime-Resin.

I. Backsplashes, Backsplash Returns, Splash Curbs (SCB), Reagent Shelves, and Reagent Shelf Supports: Same material as adjacent countertop.

## 2.03 LABORATORY EPOXY RESIN SINK LSK-1

A. Description:

1. Single Compartment: One-piece, molded epoxy resin with coved corners and corner outlet.
2. Size: 21-1/2 inches long by 15-1/2 inches wide by 11 inches deep interior dimensions.
3. Epoxy resin sink drain outlet complete with removable strainer, stopper, and 1-1/2-inch tailpiece.

B. Manufacturers and Products:

1. Durcon; Model No. D45.
2. Prime Industries; Model No. P-45.

## 2.04 CASEWORK FABRICATION

A. Construct casework of plywood or composition board core, at manufacturer's option, covered with laminated plastic sheets on both surfaces.

- B. Furnish manufacturer's standard modular units conforming as closely as possible to dimensions and configurations shown on Drawings, or specially made casework units where standard sized units do not conform to dimensions and configurations shown on Drawings.
- C. Construct casework with face screwed fasteners. Do not depend on mechanical fastening, gluing, or screwing of core edges for strength.
- D. Excluding countertops, fabricate cabinet surfaces (fronts, backs, sides, tops, bottoms, shelves, doors, drawer fronts, bases, and fillers) with minimum 3/4-inch-thick plywood or composition board covered with chemical-resistant plastic laminate on both sides bonded by polyester resin at high pressure and temperature. Seal and protect cabinet and drawer surfaces from water intrusion.
- E. Radius exposed corners at least 1/4 inch.
- F. Protect edges from water intrusion including edges not exposed to view, e.g. resting on base, sitting on floor, standing behind cabinet. Install vinyl edges on exposed edges of cabinets, doors, and drawers. Locate joints in vinyl edges where least noticeable. Bond under pressure with waterproof hot melt glue and finish with smooth, radiused edges, and corners.
- G. Cabinet Bases:
  - 1. Design and construct separately from side and back panels to support cabinets rigidly in true alignment.
  - 2. Material: Marine grade exterior plywood.
  - 3. Height: 4 inches.
  - 4. Install adjustable leveling feet at each corner and at intermediate points necessary for rigid support.
- H. Countertops: Self-edged type.
- I. Backsplashes and Splash Curbs: Field glued.
- J. Cabinet Fronts: Flush design with no projecting edges.

## **PART 3 EXECUTION**

### **3.01 INSPECTION AND PREPARATION**

- A. Make field measurements of items or conditions affecting casework, equipment, and furnishings.



- B. Examine grounds and supports of casework to assure adequate anchorage, free of foreign material, moisture, and unevenness that would prevent quality casework installation.
- C. Verify that ventilation outlets, service connections, and supports are correct and in proper location.
- D. Identify and correct defects before proceeding with installation.

### 3.02 INSTALLATION

- A. Use proper type of anchoring devices for materials encountered. Accurately place anchor bolts using templates furnished by equipment manufacturer and as specified in Section 05 50 00, Metal Fabrications.
- B. Install in accordance with manufacturer's instructions.
- C. Except where noted, install in new and ready-to-use condition.
- D. Cut, fit, patch, and provide support where required for proper and complete installation.
- E. Casework:
  - 1. Secure casework in place in true alignment, level, and plumb. Secure casework units to cleats anchored to building structure or wall framing. Install wall-hung cabinets to firmly and rigidly support cabinet weight plus normally expected cabinet content weight.
  - 2. Fasten together adjoining cabinets in an assembly joined at top and bottom of front and back with bolts placed inconspicuously inside cabinets.
  - 3. Close exposed-to-view openings larger than joints with filler of same material and finish as adjacent casework. Secure filler to casework with concealed screws. Use minimum width and number of fillers consistent with need. Except where shown on Drawings, do not use filler panels (FPL) exceeding 6-inch width.
  - 4. Install cabinet front face 3 inches in front of cabinet base face to provide toe space.
  - 5. Anchor shelf fasteners with screws when seismic edges used. Position shelves as directed by Owner.

F. Countertops:

1. Install standing height countertop's working surface 37 inches above finished floor. Install desk height countertop's working surface 31 inches above finished floor.
2. Install level to within 1/16 inch in 10 feet and in largest possible increments.
3. Where not supported by base cabinets or other furnishings, use brackets or other support on minimum 3-foot centers.
4. Make joints with manufacturer-provided cement containing same color and chemical-resistance characteristics as top material. Leave joints smooth and in same plane as top.

G. Laboratory Sinks and Service Fixtures:

1. Install in countertops and cases in manner recommended by manufacturer.
2. Take care to avoid scratches and other damage to cases and countertops.
3. Install ready for connection of services.

H. Furnishings:

1. Provide equipment with connection terminals for plumbing, gas, steam, electrical, ventilation, and refrigeration service connections where required.
2. Where items are supplied without line cords, furnish line cord and plug compatible with electrical service and available outlets.

3.03 ADJUSTING AND CLEANING

- A. Adjust hardware and leave in smooth, easy condition. Remove protective maskings. Clean surfaces ready for use. Restore stained or discolored finishes or replace item.
- B. Inspect, adjust, clean, and test service fixtures to assure intended operation.

**END OF SECTION**

**SECTION 14 21 23.16**  
**MACHINE ROOM-LESS HYDRAULIC PASSENGER ELEVATORS**

**PART 1      GENERAL**

**1.01      SUMMARY**

- A.    Section includes: Machine room-less hydraulic passenger elevators as shown and specified. Elevator work includes:
1.    Standard pre-engineered hydraulic passenger elevators.
  2.    Elevator car enclosures, hoistway entrances and signal equipment.
  3.    Operation and control systems.
  4.    Accessibility provisions for physically disabled persons.
  5.    Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
  6.    Materials and accessories as required to complete the elevator installation.
- B.    Related Sections:
1.    Division 1 General Requirements: Meet or exceed all referenced sustainability requirements.
  2.    Division 3 Concrete: Installing inserts, sleeves and anchors in concrete.
  3.    Division 4 Masonry: Installing inserts, sleeves and anchors in masonry.
  4.    Division 5 Metals:
    - a.    Providing hoist beams, pit ladders, steel framing, auxiliary support steel and divider beams for supporting guide-rail brackets.
    - b.    Providing steel angle sill supports and grouting hoistway entrance sills and frames.
  5.    Division 9 Finishes: Providing elevator car finish flooring and field painting unfinished and shop primed ferrous materials.
  6.    Division 26 Sections:
    - a.    Providing electrical service to elevators. The disconnecting means for the 480V and 120V power that is distributed to the elevator control panel shall be integral to the elevator control panel.
    - b.    Heat and smoke sensing devices.
    - c.    Convenience outlets and illumination in elevator hoistway. The lights within the elevator shall be provided and installed by the elevator manufacturer.
  7.    Division 22 Plumbing: Sump pit and oil interceptor.
  8.    Division 23 Heating, Ventilation and Air Conditioning: Heating and ventilating hoistways and/or control room.

- C. Work Not Included: General contractor shall provide the following in accordance with the requirements of the Model Building Code and ANSI A17.1 Code. For specific rules, refer to ANSI A17.1, Part 3 for hydraulic elevators. State or local requirements must be used if more stringent. The cost of this work is not included in the thyssenkrupp Elevator's proposal, since it is a part of the building construction.
1. Elevator hoist beam to be provided at top of elevator shaft. Beam must be able to accommodate proper loads and clearances for elevator installation and operation.
  2. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports and bracing including all setting templates and diagrams for placement.
  3. Hatch walls require a minimum two hours of fire rating. Hoistway should be clear and plumb with variations not to exceed 1/2 inch at any point.
  4. Elevator hoistways shall have barricades, as required.
  5. Install bevel guards at 75 degree on all recesses, projections or setbacks over 2 inches (4" for A17.1 2000 areas) except for loading or unloading.
  6. Provide rail bracket supports at pit, each floor and roof. For guide rail bracket supports, provide divider beams between hoistway at each floor and roof.
  7. Pit floor shall be level and free of debris. Reinforce dry pit to sustain normal vertical forces from rails and buffers.
  8. Where pit access is by means of the lowest hoistway entrance, a vertical ladder of non-combustible material extending 42 inches minimum, (48" minimum for A17.1-2000 areas) shall be provided at the same height, above sill of access door or handgrips.
  9. All wire and conduit should run remote from the hoistways.
  10. When heat, smoke or combustion sensing devices are required, connect to elevator control cabinet terminals. Contacts on the sensors should be sided for 12 volt D.C.
  11. Install and furnish finished flooring in elevator cab.
  12. Finished floors and entrance walls are not to be constructed until after sills and door frames are in place. Consult elevator contractor for rough opening size. The general contractor shall supply the drywall framing so that the wall fire resistance rating is maintained, when drywall construction is used.

13. Where sheet rock or drywall construction is used for front walls, it shall be of sufficient strength to maintain the doors in true lateral alignment. Drywall contractor to coordinate with elevator contractor.
14. Before erection of rough walls and doors; erect hoistway sills, headers, and frames. After rough walls are finished; erect fascias and toe guards. Set sill level and slightly above finished floor at landings.
15. To maintain legal fire rating (masonry construction), door frames are to be anchored to walls and properly grouted in place.
16. The elevator wall shall interface with the hoistway entrance assembly and be in strict compliance with the elevator contractor's requirements.
17. General Contractor shall fill and grout around entrances, as required.
18. All walls and sill supports must be plumb where openings occur.
19. Locate a light fixture (200 lx / 19 fc) and convenience outlet in pit with switch located adjacent to the access door.
20. Provide telephone line, light fixture (200 lx / 19 fc), and convenience outlet in the hoistway at the landing where the elevator controller is located. Typically this will be at the landing above the 1st floor. Final location must be coordinated with elevator contractor.
21. As indicated by elevator contractor, provide a light outlet for each elevator, in center of hoistway.
22. For signal systems and power operated door: provide ground and branch wiring circuits.
23. For car light and fan: provide a feeder and branch wiring circuits to elevator control cabinet.
24. Controller landing wall thickness must be a minimum of 8 inches thick. This is due to the controller being mounted on the second floor landing in the door frame on the return side of the door. For center opening doors, the controller is located on the right hand frame (from inside the elevator cab looking out). These requirements must be coordinated between the general contractor and the elevator contractor.
25. Cutting, patching and recesses to accommodate hall button boxes, signal fixtures, etc.

## 1.02 SUBMITTALS

- A. Product data: When requested, the elevator contractor shall provide standard cab, entrance and signal fixture data to describe product for approval.
- B. Shop drawings:
  1. Show equipment arrangement in the corridor, pit, and hoistway and/or optional control room. Provide plans, elevations, sections and details of assembly, erection, anchorage, and equipment location.

2. Indicate elevator system capacities, sizes, performances, safety features, finishes and other pertinent information.
  3. Show floors served, travel distances, maximum loads imposed on the building structure at points of support and all similar considerations of the elevator work.
  4. Indicate electrical power requirements and branch circuit protection device recommendations.
- C. Powder Coat paint selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- D. Plastic laminate selection: Submit manufacturer's standard selection charts for exposed finishes and materials.
- E. Metal Finishes: Upon request, standard metal samples provided.
- F. Operation and maintenance data. Include the following:
1. Owner's manuals and wiring diagrams.
  2. Parts list, with recommended parts inventory.

#### 1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An approved manufacturer with minimum 15 years of experience in manufacturing, installing, and servicing elevators of the type required for the project.
1. The manufacturer of machines, controllers, signal fixtures, door operators cabs, entrances, and all other major parts of elevator operating equipment.
    - a. The major parts of the elevator equipment shall be manufactured by the installing company, and not be an assembled system.
  2. The manufacturer shall have a documented, on-going quality assurance program.
  3. ISO-9001:2000 Manufacturer Certified.
  4. ISO-14001:2004 Environmental Management System Certified.
  5. LEED Gold certified elevator manufacturing facility.
- B. Installer Qualifications: The manufacturer or an authorized agent of the manufacturer with not less than 15 years of satisfactory experience installing elevators equal in character and performance to the project elevators.

C. Regulatory Requirements:

1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
2. Building Code: National.
3. NFPA 70 National Electrical Code.
4. NFPA 80 Fire Doors and Windows.
5. Americans with Disabilities Act - Accessibility Guidelines (ADAAG).
6. Section 407 in ICC A117.1, when required by local authorities.
7. CAN/CSA C22.1 Canadian Electrical Code.
8. CAN/CSA B44 Safety Code for Elevators and Escalators.
9. California Department of Public Health Standard Method V1.1–2010, CA Section 01350.

D. Fire-rated entrance assemblies: Opening protective assemblies including frames, hardware, and operation shall comply with ASTM E2074, CAN4-S104 (ULC-S104), UL10(b), and NFPA Standard 80. Provide entrance assembly units bearing Class B or 1 1/2 hour label by a Nationally Recognized Testing Laboratory (2 hour label in Canada).

E. Inspection and testing:

1. Elevator Installer shall obtain and pay for all required inspections, tests, permits and fees for elevator installation.
2. Arrange for inspections and make required tests.
3. Deliver to the Owner upon completion and acceptance of elevator work.

F. Sustainable Product Qualifications:

1. Environmental Product Declaration:
  - a. GOOD: If Product Category Rules (PCR) are not available, produce a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that has at least a cradle to gate scope.
  - b. BEST: If Product Category Rules (PCR) are available, produce and publish an Environmental Product Declaration (EPD) based on a critically reviewed life-cycle assessment conforming to ISO 14044, with external verification recognized by the EPD program operator.

2. Material Transparency:
  - a. GOOD: Provide Health Product Declaration at any level
  - b. BETTER: Provide Health Product Declaration (HPD v2 or later). Complete, published declaration with full disclosure of known hazards, prepared using the Health Product Declaration Collaborative's "HPD builder" on-line tool.
  - c. BEST: Cradle to Cradle Material Health Certificate v3, Bronze level or higher.
3. LEED v4 – Provide documentation for all Building Product Disclosure AND Optimization credits in LEED v4 for product specified.
4. Living Building Challenge Projects: Provide Declare label for products specified.

#### 1.04 DELIVERY, STORAGE AND HANDLING

- A. Manufacturing shall deliver elevator materials, components and equipment and the Contractor is responsible to provide secure and safe storage on Project Site.

#### 1.05 PROJECT CONDITIONS

- A. Temporary Use: Elevators shall not be used for temporary service or for any other purpose during the construction period before Substantial Completion and acceptance by the purchaser unless agreed upon by Elevator Contractor and General Contractor with signed temporary agreement.

#### 1.06 WARRANTY

- A. Warranty: Submit elevator manufacturer's standard written warranty agreeing to repair, restore or replace defects in elevator work materials and workmanship not due to ordinary wear and tear or improper use or care for 12 months after final acceptance.

#### 1.07 MAINTENANCE

- A. Furnish maintenance and call back service for a period of 12 months for each elevator after completion of installation or acceptance thereof by beneficial use, whichever is earlier, during normal working hours excluding callbacks.
  1. Service shall consist of periodic examination of the equipment, adjustment, lubrication, cleaning, supplies and parts to keep the elevators in proper operation. Maintenance work, including emergency call back repair service, shall be performed by trained employees of the elevator contractor during regular working hours.



2. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. Parts shall be produced by manufacturer of original equipment.
3. Manufacturer shall have a service office and full time service personnel within a 100 mile radius of the Project Site.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Manufacturer: Design based around thyssenkrupp Elevator's endura Machine Room-Less hydraulic elevator.

### **2.02 MATERIALS, GENERAL**

- A. All Elevator Cab materials including frame, buttons, lighting, wall and ceiling assembly, laminates and carpet shall have an EPD and an HPD, and shall meet the California Department of Public Health Standard Method V1.1-2010, CA Section 01350 as mentioned in 1.03.9 of this specification.
- B. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.
- C. Steel:
  1. Shapes and bars: Carbon.
  2. Sheet: Cold-rolled steel sheet, commercial quality, Class 1, matte finish.
  3. Finish: Factory-applied baked enamel for structural parts, powder coat for architectural parts. Color selection must be based on elevator manufacture's standard selections.
- D. Plastic laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050 inches thickness. Laminate selection must be based on elevator manufacture's standard selections.
- E. Flooring by others.

### **2.03 HOISTWAY EQUIPMENT**

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood sub-floor. Underside of the platform shall be fireproofed. The car platform shall be designed and fabricated to support one-piece loads weighing up to 25 percent of the rated capacity.

- B. Sling: Steel stiles bolted or welded to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.
- C. Guide Rails: Steel, omega shaped, fastened to the building structure with steel brackets.
- D. Guides: Slide guides shall be mounted on top and bottom of the car.
- E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.
- F. Jack: A jack unit shall be of sufficient size to lift the gross load the height specified. Factory test jack to ensure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Provide the following jack type: Twin post holeless telescopic 2-stage. Two jacks piped together, mounted one on each side of the car with each having two telescopic sections designed to extend in a synchronized manner when oil is pumped into the assembly. Each jack section will be guided from within the casing or the plunger assembly used to house the section. Each plunger shall have a high pressure sealing system which will not allow for seal movement or displacement during the course of operation. Each jack assembly shall have a check valve built into the assembly to allow for automatically re-syncing the two plunger sections by moving the jack to its fully contracted position. The jack shall be designed to be mounted on the pit floor or in a recess in the pit floor. Each jack section shall have a bleeder valve to discharge any air trapped in the section.
- G. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for over travel or under travel. Self-leveling shall, within its zone, be automatic and independent of the operating device. The car shall be maintained approximately level with the landing irrespective of its load.
- H. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary code compliant pipe and fittings shall be provided to connect the power unit to the jack unit. The oil type.

- I. Pit moisture/water sensor located approximately 1 foot above the pit floor to be provided. Once activated, elevator will perform “flooded pit operation”, which will run the car up to the designated floor, cycle the doors and shut down and trip the circuit breaker shunt to remove 3 phase power from all equipment, including pit equipment.
- J. Motorized oil line shut-off valve shall be provided that can be remotely operated from the controller landing service panel. Also a means for manual operation at the valve in the pit is required.

## 2.04 POWER UNIT

- A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit located in the elevator pit consisting of the following items:
  - 1. NEMA 4/Sealed Oil reservoir with tank cover including vapor removing tank breather
  - 2. An oil hydraulic pump.
  - 3. An electric motor.
  - 4. Electronic oil control valve with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and electro-magnetic controlling solenoids.
- B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.
- C. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating – motors shall be capable of 80 starts per hour with a 30% motor run time during each start.
- D. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
  - 1. Relief valve shall be adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.

2. Up start and stop valve shall be adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
4. Lowering valve and leveling valve shall be adjustable for down start speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling after slowdown is initiated.
5. Provided with constant speed regulation in both up and down direction. Feature to compensate for load changes, oil temperature, and viscosity changes.
6. Solid State Starting: Provide an electronic starter featuring adjustable starting currents.
7. A secondary hydraulic power source (powered by 110V ac single phase) must be provided. This is required to be able to raise (reposition) the elevator in the event of a system component failure (i.e. pump motor, starter, etc.).
8. Oil Type: USDA certified biobased product, ultra low toxicity, readily biodegradable, energy efficient, high performing fluid made from canola oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives. Especially formulated for operating in environmentally sensitive areas. USDA certified biobased product, >90 percent bio-based content, per ASTM D6866.

## 2.05 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening bolted\knock down construction.
  1. Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates (where required), sight guards, and necessary hardware.
  2. Main landing door and frame finish: Stainless steel panels, No. 4 brushed finish.
  3. Typical door and frame finish: Stainless steel panels, No. 4 brushed finish.

- B. Integrated Control System: the elevator controller to be mounted to hoistway entrance above 1st landing. The entrance at this level, shall be designed to accommodate the control system and provide a means of access to critical electrical components and troubleshooting features. See section 2.09 Control System for additional requirements.
- C. At the controller landing, the hoistway entrance frame shall have space to accommodate and provide a lockable means of access (group 2 security) to a 3 phase circuit breaker. See section 2.11 Miscellaneous Elevator Components for further details.
- D. Interlocks: Equip each hoistway entrance with an approved type interlock tested as required by code. Provide door restriction devices as required by code.
- E. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway horizontal sliding door.
  - 1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
  - 2. Hangers: Provide an adjustable device beneath the track to limit the up-thrust of the doors during operation.
  - 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.
- F. Hoistway Sills: Extruded metal, with groove(s) in top surface. Provide mill finish on aluminum.

## 2.06 PASSENGER ELEVATOR CAR ENCLOSURE

- A. Car Enclosure:
  - 1. Walls: Cab type a steel shell design, reinforced cold-rolled steel with an applied panel design. The applied panels design, shall be arranged vertically on wood core panels covered on both sides with high pressure plastic laminate.
  - 2. Reveals and frieze: Stainless steel, No. 4 brushed finish
  - 3. Canopy: Cold-rolled steel with hinged exit.
  - 4. Ceiling: Downlight type, metal pans with suspended LED downlights and dimmer switch. Number of downlights shall be dependent on platform size with a minimum of six. The metal pans shall be finished with a stainless steel, no. 4 brushed finish.

5. Cab Fronts, Return, Transom, Soffit and Strike: Provide panels faced with No. 4 brushed stainless steel.
  6. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic sliding guides.
    - a. Door Finish: Stainless steel panels: No. 4 brushed finish.
    - b. Cab Sills: Extruded aluminum, mill finish.
  7. Handrail: Provide 1.5 inch diameter cylindrical metal on side and rear walls on front opening cars and side walls only on front and rear opening cars. Handrails shall have a stainless steel, No. 4 brushed finish.
  8. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.
  9. Protection pads and buttons: Provide one set of vinyl protection pads with metal grommets for the Project. Provide pad buttons on cab front(s) and walls.
- B. Car Top Inspection: Provide a car top inspection station with an "Auto-Inspection" switch, an "emergency stop" switch, and constant pressure "up and down" direction and safety buttons to make the normal operating devices inoperative. The station shall give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

## 2.07 DOOR OPERATION

- A. Door Operation: Provide a direct or alternating current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. The door control system shall be digital closed loop and the closed loop circuit shall give constant feedback on the position and velocity of the elevator door. The motor torque shall be constantly adjusted to maintain the correct door speed based on its position and load. All adjustments and setup shall be through the computer based service tool. Door movements shall follow a field programmable speed pattern with smooth acceleration and deceleration at the ends of travel. The mechanical door operating mechanism shall be arranged for manual operation in event of power failure. Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. AC controlled units with oil checks, or other deviations are not acceptable.
1. No Un-Necessary Door Operation: The car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as a dispatch car.

2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.
  3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel shall reverse and the door shall reopen to answer the other call.
  4. Nudging Operation: The doors shall remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door closing is prevented for a field programmable time, a buzzer shall sound. When the obstruction is removed, the door shall begin to close at reduced speed. If the infra-red door protection system detects a person or object while closing on nudging, the doors shall stop and resume closing only after the obstruction has been removed.
  5. Door Reversal: If the doors are closing and the infra-red beam(s) is interrupted, the doors shall reverse and reopen. After the obstruction is cleared, the doors shall begin to close.
  6. Door Open Watchdog: If the doors are opening, but do not fully open after a field adjustable time, the doors shall recycle closed then attempt to open six times to try and correct the fault.
  7. Door Close Watchdog: If the doors are closing, but do not fully close after a field adjustable time, the doors shall recycle open then attempt to close six times to try and correct the fault.
  8. Door Close Assist: When the doors have failed to fully close and are in the recycle mode, the door drive motor shall have increased torque applied to possibly overcome mechanical resistance or differential air pressure and allow the door to close.
- B. Door Protection Device: Provide a door protection system using microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen.

## 2.08 CAR OPERATING STATION

- A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in an integral swing return panel requiring no applied faceplate. Wrap return shall have a No. 4 brushed stainless steel finish. The main car operating panel shall be mounted in the return and comply with handicap requirements. Pushbuttons that illuminate using long lasting LED's shall be included for each floor served, and emergency buttons and switches shall be provided per code. Switches for car light and accessories shall be provided.
- B. Emergency Communications System: Integral phone system provided.
- C. Auxiliary Operating Panel: Not Required.
- D. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.
- E. Special Equipment: Not Applicable.

## 2.09 CONTROL SYSTEMS

- A. Controller: Shall be integrated in a hoistway entrance jamb. Should be microprocessor based, software oriented and protected from environmental extremes and excessive vibrations in a NEMA 1 enclosure. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.
- B. Service Panel – to be located outside the hoistway in the controller entrance jamb and shall provide the following functionality/features:
  - 1. Access to main control board and CPU.
  - 2. Main controller diagnostics.
  - 3. Main controller fuses.
  - 4. Universal Interface Tool (UIT).
  - 5. Remote valve adjustment.
  - 6. Electronic motor starter adjustment and diagnostics.
  - 7. Operation of pit motorized shut-off valve with LED feedback to the state of the valve in the pit.



8. Operation of auxiliary pump/motor (secondary hydraulic power source).
  9. Operation of electrical assisted manual lowering.
  10. Provide male plug to supply 110V ac into the controller.
  11. Run/Stop button.
- C. Automatic Light and Fan shut down: The control system shall evaluate the system activity and automatically turn off the cab lighting and ventilation fan during periods of inactivity. The settings shall be field programmable.
- D. Emergency Power Operation: (Battery Lowering 10-DOC) When the loss of normal power is detected, a battery lowering feature is to be activated. The elevator will lower to a predetermined level and open the doors. After passengers have exited the car, the doors will close and the car will shutdown. When normal power becomes available, the elevator will automatically resume operation. The battery lowering feature is included in the elevator contract and does not utilize a building-supplied standby power source.
- E. Special Operation: Not Applicable.

## 2.10 HALL STATIONS

- A. Hall Stations, General: Buttons shall illuminate to indicate call has been registered at that floor for the indicated direction.
1. Provide one pushbutton riser with faceplates having a No. 4 brushed stainless steel finish.
    - a. Phase 1 firefighter's service key switch, with instructions, shall be incorporated into the hall station at the designated level.
- B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.
- C. Hall Position Indicator: Not Applicable.
- D. Hall lanterns: Not Applicable.
- E. Special Equipment: Not Applicable.

## 2.11 MISCELLANEOUS ELEVATOR COMPONENTS

- A. Oil Hydraulic Silencer: Install multiple oil hydraulic silencers (muffler device) at the power unit location. The silencers shall contain pulsation absorbing material inserted in a blowout proof housing.

- B. Lockable three phase circuit breaker with auxiliary contact with shunt trip capability to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb and should be sized according to the National Electrical Code.
- C. Lockable single phase 110V circuit breaker for cab light and fan to be provided. Circuit breaker to be located behind locked panel (Group 2 security access) at controller landing entrance jamb should be sized according to the National Electrical Code.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Before starting elevator installation, inspect hoistway, hoistway openings, pits and/or control room, as constructed, verify all critical dimensions, and examine supporting structures and all other conditions under which elevator work is to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

#### **3.02 INSTALLATION**

- A. Install elevator systems components and coordinate installation of hoistway wall construction.
  - 1. Work shall be performed by competent elevator installation personnel in accordance with ASME A17.1, manufacturer's installation instructions and approved shop drawings.
  - 2. Comply with the National Electrical Code for electrical work required during installation.
- B. Perform work with competent, skilled workmen under the direct control and supervision of the elevator manufacturer's experienced foreman.
- C. Supply in ample time for installation by other trades, inserts, anchors, bearing plates, brackets, supports, and bracing including all setting templates and diagrams for placement.

- D. Welded construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualification of welding operators.
- E. Coordination: Coordinate elevator work with the work of other trades, for proper time and sequence to avoid construction delays. Use benchmarks, lines, and levels designated by the Contractor, to ensure dimensional coordination of the work.
- F. Install machinery, guides, controls, car and all equipment and accessories to provide a quiet, smoothly operating installation, free from side sway, oscillation or vibration.
- G. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum safe, workable dimensions at each landing.
- H. Erect hoistway sills, headers, and frames before erection of rough walls and doors; erect fascia and toe guards after rough walls finished. Set sill units accurately aligned and slightly above finish floor at landings.
- I. Lubricate operating parts of system, where recommended by manufacturer.

### 3.03 FIELD QUALITY CONTROL

- A. Acceptance testing: Upon completion of the elevator installation and before permitting use of elevator, perform acceptance tests as required and recommended by Code and governing regulations or agencies. Perform other tests, if any, as required by governing regulations or agencies.
- B. Advise Owner, Contractor, Architect, and governing authorities in advance of dates and times tests are to be performed on the elevator.

### 3.04 ADJUSTING

- A. Make necessary adjustments of operating devices and equipment to ensure elevator operates smoothly and accurately.

### 3.05 CLEANING

- A. Before final acceptance, remove protection from finished surfaces and clean and polish surfaces in accordance with manufacturer's recommendations for type of material and finish provided. Stainless steel shall be cleaned with soap and water and dried with a non-abrasive surface; it shall not be cleaned with bleach-based cleansers.
- B. At completion of elevator work, remove tools, equipment, and surplus materials from Site. Clean equipment rooms and hoistway. Remove trash and debris.
  - 1. Use environmentally preferable and low VOC emitting cleaners for each application type. Cleaners that contain solvents, pine and/or citrus oils are not permitted.

### 3.06 PROTECTION

- A. At time of Substantial Completion of elevator work, or portion thereof, provide suitable protective coverings, barriers, devices, signs, or other such methods or procedures to protect elevator work from damage or deterioration. Maintain protective measures throughout remainder of construction period.

### 3.07 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.
- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

### 3.08 ELEVATOR SCHEDULE

- A. Elevator Qty. 1.
  - 1. Elevator Model: enduraMRL Above-Ground (2-Stage).
  - 2. Elevator Type: Hydraulic Machine Room-Less, Passenger.
  - 3. Rated Capacity: 3500 pounds.
  - 4. Rated Speed: 110 ft./min.
  - 5. Operation System: TAC32H.
  - 6. Travel: 15'-8".
  - 7. Landings: 2 total.

8. Openings:
  - a. Front: 2.
  - b. Rear: 0.
9. Clear Car Inside: 6' - 8" wide by 5' - 5" deep.
10. Cab Height: 8'-0" standard.
11. Hoistway Entrance Size: 3' - 6" wide x 7'-0" high.
12. Door Type: Single Speed.
13. Power Characteristics: 460 volts, 3 Phase, 60 Hz 90A Power Supply and a 20A, 120V, single-phase power feed.
14. Seismic Requirements: Zone 1.
15. Hoistway Dimensions: 8' - 4" wide x 6' - 11" deep.
16. Pit Depth: 4' - 0".
17. Button & Fixture Style: Traditional Signal Fixtures.
18. Special Operations: None.

3.09 SPECIAL CONDITIONS

- A. (Note: Add Special Conditions as Needed).

**END OF SECTION**

