

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
HIGHWAY DIVISION 2

**PROPOSAL**

**DATE AND TIME OF BID OPENING: SEPTEMBER 27, 2017 AT 2:00 PM**

**CONTRACT ID: 11733797**

**WBS ELEMENT NO.: 51213.031**

**FEDERAL AID NO.: N/A**

**COUNTY: CATERET**

**TIP NO.: N/A**

**MILES: N/A**

**ROUTE NO.: US 70**

**LOCATION: CARTERET COUNTY REST AREA**

**★ TYPE OF WORK: CARTERET COUNTY REST AREA RENOVATION ★**

**NOTICE:**

ALL BIDDERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE BIDDER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE BID IS \$30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD. BIDDERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA. NOTWITHSTANDING THESE LIMITATIONS ON BIDDING, THE BIDDER WHO IS AWARDED ANY FEDERAL - AID FUNDED PROJECT SHALL COMPLY WITH CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA FOR LICENSING REQUIREMENTS WITHIN 60 CALENDAR DAYS OF BID OPENING.

**BIDS WILL BE RECEIVED AS SHOWN BELOW:**

**THIS IS A ROADWAY PROJECT.**

**BID BONDS ARE REQUIRED.**

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**NAME OF BIDDER**

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**ADDRESS OF BIDDER**

**PROPOSAL FOR THE CONSTRUCTION OF  
CONTRACT No. 11733797 IN CARTERET COUNTY, NORTH CAROLINA  
August 30, 2017  
DEPARTMENT OF TRANSPORTATION,  
RALEIGH, NORTH CAROLINA**

The Bidder has carefully examined the location of the proposed work to be known as Contract No. 11733797; has carefully examined the plans and specifications, which are acknowledged to be part of the proposal, the special provisions, the proposal, the form of contract, and the forms of contract payment bond and contract performance bond; and thoroughly understands the stipulations, requirements and provisions. The undersigned bidder agrees to bound upon his execution of the bid and subsequent award to him by the Department of Transportation in accordance with this proposal to provide the necessary contract payment bond and contract performance bond within fourteen days after the written notice of award is received by him. The undersigned Bidder further agrees to provide all necessary machinery, tools, labor, and other means of construction; and to do all the work and to furnish all materials, except as otherwise noted, necessary to perform and complete the said contract in accordance with *the 2012 Standard Specifications for Roads and Structures* by the dates(s) specified in the Project Special Provisions and in accordance with the requirements of the Engineer, and at the unit or lump sum prices, as the case may be, for the various items given on the sheets contained herein.

The Bidder shall provide and furnish all the materials, machinery, implements, appliances and tools, and perform the work and required labor to construct and complete State Highway Contract No. 11733797 in Carteret County, for the unit or lump sum prices, as the case may be, bid by the Bidder in his bid and according to the proposal, plans, and specifications prepared by said Department, which proposal, plans, and specifications show the details covering this project, and hereby become a part of this contract.

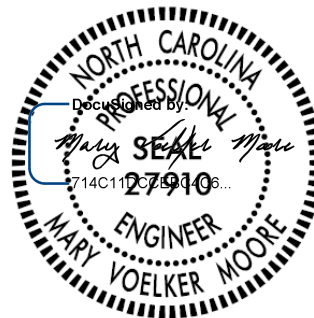
The published volume entitled *North Carolina Department of Transportation, Raleigh, Standard Specifications for Roads and Structures, January 2012* with all amendments and supplements thereto, is by reference incorporated into and made a part of this contract; that, except as herein modified, all the construction and work included in this contract is to be done in accordance with the specifications contained in said volume, and amendments and supplements thereto, under the direction of the Engineer.

If the proposal is accepted and the award is made, the contract is valid only when signed either by the Contract Officer or such other person as may be designated by the Secretary to sign for the Department of Transportation. The conditions and provisions herein cannot be changed except over the signature of the said Contract Officer or Division Engineer.

The quantities shown in the itemized proposal for the project are considered to be approximate only and are given as the basis for comparison of bids. The Department of Transportation may increase or decrease the quantity of any item or portion of the work as may be deemed necessary or expedient.

An increase or decrease in the quantity of an item will not be regarded as sufficient ground for an increase or decrease in the unit prices, nor in the time allowed for the completion of the work, except as provided for the contract.

Accompanying this bid is a bid bond secured by a corporate surety, or certified check payable to the order of the Department of Transportation, for five percent of the total bid price, which deposit is to be forfeited as liquidated damages in case this bid is accepted and the Bidder shall fail to provide the required payment and performance bonds with the Department of Transportation, under the condition of this proposal, within 14 calendar days after the written notice of award is received by him, as provided in the *Standard Specifications*; otherwise said deposit will be returned to the Bidder.



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**INSTRUCTIONS TO BIDDERS****PLEASE READ ALL INSTRUCTIONS CAREFULLY  
BEFORE PREPARING AND SUBMITTING YOUR BID.**

All bids shall be prepared and submitted in accordance with the following requirements. Failure to comply with any requirement may cause the bid to be considered irregular and may be grounds for rejection of the bid.

**TRADITIONAL PAPER BIDS:**

1. Download the entire proposal from the Connect NCDOT website and return the entire proposal with your bid.
2. All entries on the itemized proposal sheet (bid form) shall be written in ink or typed.
3. The Bidder shall submit a unit price for every item on the itemized proposal sheet. The unit prices for the various contract items shall be written in figures. Unit prices shall be rounded off by the Bidder to contain no more than FOUR decimal places.
4. An amount bid shall be entered on the itemized proposal sheet for every item. The amount bid for each item shall be determined by multiplying each unit bid by the quantity for that item, and shall be written in figures in the "Amount" column of the form.
5. The total amount bid shall be written in figures in the proper place on the bid form. The total amount bid shall be determined by adding the amounts bid for each item.
6. Changes to any entry shall be made by marking through the entry in ink and making the correct entry adjacent thereto in ink. A representative of the Bidder shall initial the change in ink. Do not use correction fluid, correction tape or similar product to make corrections.
7. The bid shall be properly executed on the included **Execution of Bid – Non-collusion Affidavit, Debarment Certification and Gift Ban Certification** form. All bids shall show the following information:
  - a. Name of corporation, partnership, limited liability company, joint venture, individual or firm, submitting bid.  
Corporations that have a corporate seal should include it on the bid.
  - b. Name of individual or representative submitting bid and position or title held on behalf of the bidder.
  - c. Name, signature, and position or title of witness.
  - d. Completed attestation by Notary Public**Note: Signer, Witness and Notary Public must be different individuals.**
8. The bid shall not contain any unauthorized additions, deletions, or conditional bids.
9. The Bidder shall not add any provision reserving the right to accept or reject an award, or to enter into a contract pursuant to an award.
10. **THE PROPOSAL WITH THE ITEMIZED PROPOSAL SHEET ATTACHED SHALL BE PLACED IN A SEALED ENVELOPE AND SHALL BE DELIVERED TO AND RECEIVED IN THE NCDOT DIVISION 2 OFFICE, LOCATED AT 105 PACTOLUS HIGHWAY, GREENVILLE, NC 27834, BY 2:00 PM ON, SEPTEMBER 27, 2017.**
11. The sealed bid must display the following statement on the front of the sealed envelope:

**ATTN: MARY V. MOORE**

**QUOTATION FOR 11733797 (US 70 REST AREA RENOVATION IN CARTERET COUNTY)**

**TO BE OPENED AT 2:00 PM ON WEDNESDAY, SEPTEMBER 27, 2017**

12. If delivered by mail, the sealed envelope shall be placed in another sealed envelope and the outer envelope shall be addressed as follows:

**N. C. DEPARTMENT OF TRANSPORTATION**

**ATTN: MARY V. MOORE**

**PO BOX 1587**

**GREENVILLE, NC 27835-1587**

**PROJECT SPECIAL PROVISIONS****GENERAL****DESCRIPTION:**

This contract is for the renovation of the US 70 rest area in Carteret County as shown on the plan sheets.

**CONTRACT TIME AND LIQUIDATED DAMAGES:**

(7-1-95) (Rev. 12-18-07)

108

SP1 G10 A

The date of availability for this contract is **October 30, 2017**.

The completion date for this contract is **March 9, 2018**.

Except where otherwise provided by the contract, observation periods required by the contract will not be a part of the work to be completed by the completion date and/or intermediate contract times stated in the contract. The acceptable completion of the observation periods that extend beyond the final completion date shall be a part of the work covered by the performance and payment bonds.

The liquidated damages for this contract are **Six Hundred Dollars (\$ 600.00)** per calendar day.

**BOND REQUIREMENTS:**

(06-01-16)

102-8, 102-10

SPD 01-420A

A Bid Bond is required in accordance with Article 102-10 of the 2012 Standard Specifications for Roads and Structures.

Contract Payment and Performance Bonds are required in accordance with Article 103-7 of the 2012 Standard Specifications for Roads and Structures.

**RAILROAD GRADE CROSSING:**

(7-1-95) (Rev. 1-15-13)

107-9

SP1 G17R

Provide at least 2 weeks advance notice to the railroad's local Roadmaster or Track Supervisor when the use of slow-moving or stopped equipment is required over at-grade railroad crossings.

**NO MAJOR CONTRACT ITEMS:**

(2-19-02) (Rev. 8-21-07)

104

SP1 G31

None of the items included in this contract will be major items.

**SPECIALTY ITEMS:**

(7-1-95)(Rev. 1-17-12)

108-6

SP1 G37

Items listed below will be the specialty items for this contract (see Article 108-6 of the *2012 Standard Specifications*).

<b>Line #</b>	<b>Description</b>
1-6	Rest Area

**FUEL PRICE ADJUSTMENT:**

(11-15-05) (Rev. 2-18-14)

109-8

SP1 G43

Revise the *2012 Standard Specifications* as follows:

**Page 1-83, Article 109-8, Fuel Price Adjustments**, add the following:

The base index price for DIESEL #2 FUEL is \$ **1.6761** per gallon. Where any of the following are included as pay items in the contract, they will be eligible for fuel price adjustment.

The pay items and the fuel factor used in calculating adjustments to be made will be as follows:

<b>Description</b>	<b>Units</b>	<b>Fuel Usage Factor Diesel</b>
Unclassified Excavation	Gal/CY	0.29
Borrow Excavation	Gal/CY	0.29
Class IV Subgrade Stabilization	Gal/Ton	0.55
Aggregate Base Course	Gal/Ton	0.55
Sub-Ballast	Gal/Ton	0.55
Asphalt Concrete Base Course, Type ____	Gal/Ton	2.90
Asphalt Concrete Intermediate Course, Type ____	Gal/Ton	2.90
Asphalt Concrete Surface Course, Type ____	Gal/Ton	2.90
Open-Graded Asphalt Friction Course	Gal/Ton	2.90
Permeable Asphalt Drainage Course, Type ____	Gal/Ton	2.90
Sand Asphalt Surface Course, Type ____	Gal/Ton	2.90
Aggregate for Cement Treated Base Course	Gal/Ton	0.55
Portland Cement for Cement Treated Base Course	Gal/Ton	0.55
__" Portland Cement Concrete Pavement	Gal/SY	0.245
Concrete Shoulders Adjacent to __" Pavement	Gal/SY	0.245

**SCHEDULE OF ESTIMATED COMPLETION PROGRESS:**

(7-15-08) (Rev. 5-17-16)

108-2

SP1 G58

The Contractor's attention is directed to the Standard Special Provision entitled *Availability of Funds Termination of Contracts* included elsewhere in this proposal. The Department of Transportation's schedule of estimated completion progress for this project as required by that Standard Special Provision is as follows:

<b>Fiscal Year</b>	<b>Progress (% of Dollar Value)</b>
2018 (7/1/2017-6/30/2018)	<b>100%</b> of Total Amount Bid

The Contractor shall also furnish his own progress schedule in accordance with Article 108-2 of the *2012 Standard Specifications*. Any acceleration of the progress as shown by the Contractor's progress schedule over the progress as shown above shall be subject to the approval of the Engineer.

**MINORITY BUSINESS ENTERPRISE AND WOMEN BUSINESS ENTERPRISE (DIVISIONS):**

(10-16-07)(Rev. 1-17-17)

102-15(J)

SP1 G67

**Description**

The purpose of this Special Provision is to carry out the North Carolina Department of Transportation's policy of ensuring nondiscrimination in the award and administration of contracts financed in whole or in part with State funds.

**Definitions**

*Additional MBE/WBE Subcontractors* - Any MBE/WBE submitted at the time of bid that will not be used to meet either the MBE or WBE goal. No submittal of a Letter of Intent is required.

*Committed MBE/WBE Subcontractor* - Any MBE/WBE submitted at the time of bid that is being used to meet either the MBE or WBE goal by submission of a Letter of Intent. Or any MBE or WBE used as a replacement for a previously committed MBE or WBE firm.

*Contract Goals Requirement* - The approved MBE and WBE participation at time of award, but not greater than the advertised contract goals for each.

*Goal Confirmation Letter* - Written documentation from the Department to the bidder confirming the Contractor's approved, committed MBE and WBE participation along with a listing of the committed MBE and WBE firms.

*Manufacturer* - A firm that operates or maintains a factory or establishment that produces on the premises, the materials or supplies obtained by the Contractor.

*MBE Goal* - A portion of the total contract, expressed as a percentage, that is to be performed by committed MBE subcontractor(s).

*Minority Business Enterprise (MBE)* - A firm certified as a Disadvantaged Minority-Owned Business Enterprise through the North Carolina Unified Certification Program.

*Regular Dealer* - A firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials or supplies required for the performance of the contract are bought, kept in stock, and regularly sold to the public in the usual course of business. A regular dealer engages in, as its principal business and in its own name, the purchase and sale or lease of the products in question. A regular dealer in such bulk items as steel, cement, gravel, stone, and petroleum products need not keep such products in stock, if it owns and operates distribution equipment for the products. Brokers and packagers are not regarded as manufacturers or regular dealers within the meaning of this section.

*North Carolina Unified Certification Program (NCUCP)* - A program that provides comprehensive services and information to applicants for MBE/WBE certification. The MBE/WBE program follows the same regulations as the federal Disadvantaged Business Enterprise (DBE) program in accordance with 49 CFR Part 26.

*United States Department of Transportation (USDOT)* - Federal agency responsible for issuing regulations (49 CFR Part 26) and official guidance for the DBE program.

*WBE Goal* - A portion of the total contract, expressed as a percentage, that is to be performed by committed WBE subcontractor(s).

*Women Business Enterprise (WBE)* - A firm certified as a Disadvantaged Women-Owned Business Enterprise through the North Carolina Unified Certification Program.

### **Forms and Websites Referenced in this Provision**

*Payment Tracking System* - On-line system in which the Contractor enters the payments made to MBE and WBE subcontractors who have performed work on the project.  
<https://apps.dot.state.nc.us/Vendor/PaymentTracking/>

*DBE-IS Subcontractor Payment Information* - Form for reporting the payments made to all MBE/WBE firms working on the project. This form is for paper bid projects only.  
<https://connect.ncdot.gov/business/Turnpike/Documents/Form%20DBE-IS%20Subcontractor%20Payment%20Information.pdf>

*RF-1 MBE/WBE Replacement Request Form* - Form for replacing a committed MBE or WBE.  
<http://connect.ncdot.gov/projects/construction/Construction%20Forms/DBE%20MBE%20WBE%20Replacement%20Request%20Form.pdf>

*SAF Subcontract Approval Form* - Form required for approval to sublet the contract.  
<http://connect.ncdot.gov/projects/construction/Construction%20Forms/Subcontract%20Approval%20Form%20Rev.%202012.zip>

*JC-1 Joint Check Notification Form* - Form and procedures for joint check notification. The form acts as a written joint check agreement among the parties providing full and prompt disclosure of the expected use of joint checks.  
<http://connect.ncdot.gov/projects/construction/Construction%20Forms/Joint%20Check%20Notification%20Form.pdf>

*Letter of Intent* - Form signed by the Contractor and the MBE/WBE subcontractor, manufacturer or regular dealer that affirms that a portion of said contract is going to be performed by the signed MBE/WBE for the amount listed at the time of bid.  
<http://connect.ncdot.gov/letting/LetCentral/Letter%20of%20Intent%20to%20Perform%20as%20a%20Subcontractor.pdf>

*Listing of MBE and WBE Subcontractors Form* - Form for entering MBE/WBE subcontractors on a project that will meet this MBE and WBE goals. This form is for paper bids only.  
[http://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/09%20MBE-WBE%20Subcontractors%20\(State\).docx](http://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/09%20MBE-WBE%20Subcontractors%20(State).docx)

*Subcontractor Quote Comparison Sheet* - Spreadsheet for showing all subcontractor quotes in the work areas where MBEs and WBEs quoted on the project. This sheet is submitted with good faith effort packages.  
<http://connect.ncdot.gov/business/SmallBusiness/Documents/DBE%20Subcontractor%20Quote%20Comparison%20Example.xls>



## **MBE and WBE Goal**

The following goals for participation by Minority Business Enterprises and Women Business Enterprises are established for this contract:

(A) **Minority Business Enterprises 0.0 %**

- (1) *If the MBE goal is more than zero*, the Contractor shall exercise all necessary and reasonable steps to ensure that MBEs participate in at least the percent of the contract as set forth above as the MBE goal.
- (2) *If the MBE goal is zero*, the Contractor shall make an effort to recruit and use MBEs during the performance of the contract. Any MBE participation obtained shall be reported to the Department.

(B) **Women Business Enterprises 0.0 %**

- (1) *If the WBE goal is more than zero*, the Contractor shall exercise all necessary and reasonable steps to ensure that WBEs participate in at least the percent of the contract as set forth above as the WBE goal.
- (2) *If the WBE goal is zero*, the Contractor shall make an effort to recruit and use WBEs during the performance of the contract. Any WBE participation obtained shall be reported to the Department.

## **Directory of Transportation Firms (Directory)**

Real-time information is available about firms doing business with the Department and firms that are certified through NCUCP in the Directory of Transportation Firms. Only firms identified in the Directory as MBE and WBE certified shall be used to meet the MBE and WBE goals respectively. The Directory can be found at the following link. [https:// www.ebs.nc.gov/VendorDirectory/default.html](https://www.ebs.nc.gov/VendorDirectory/default.html)

The listing of an individual firm in the directory shall not be construed as an endorsement of the firm's capability to perform certain work.

## **Listing of MBE/WBE Subcontractors**

At the time of bid, bidders shall submit all MBE and WBE participation that they anticipate to use during the life of the contract. Only those identified to meet the MBE goal and the WBE goal will be considered committed, even though the listing shall include both committed MBE/WBE subcontractors and additional MBE/WBE subcontractors. Any additional MBE/WBE subcontractor participation submitted at the time of bid will be used toward overall race-neutral goals. Only those firms with current MBE and WBE certification at the time of bid opening will be acceptable for listing in the bidder's submittal of MBE and WBE participation. The Contractor shall indicate the following required information:

(A) *If either the MBE or WBE goal is more than zero*,

- (1) Bidders, at the time the bid proposal is submitted, shall submit a listing of MBE/WBE participation, including the names and addresses on *Listing of MBE and WBE Subcontractors* contained elsewhere in the contract documents in order for the bid to be considered responsive. Bidders shall indicate the total dollar value of the MBE and WBE participation for the contract.

- (2) If bidders have no MBE or WBE participation, they shall indicate this on the *Listing of MBE and WBE Subcontractors* by entering the word "None" or the number "0." This form shall be completed in its entirety. **Blank forms will not be deemed to represent zero participation.** Bids submitted that do not have MBE and WBE participation indicated on the appropriate form will not be read publicly during the opening of bids. The Department will not consider these bids for award and the proposal will be rejected.
  - (3) The bidder shall be responsible for ensuring that the MBE/WBE is certified at the time of bid by checking the Directory of Transportation Firms. If the firm is not certified at the time of the bid-letting, that MBE's or WBE's participation will not count towards achieving the corresponding goal.
- (B) *If either the MBE or WBE goal is zero, entries on the Listing of MBE and WBE Subcontractors are not required for the zero goal, however any MBE or WBE participation that is achieved during the project shall be reported in accordance with requirements contained elsewhere in the special provision.*

### **MBE or WBE Prime Contractor**

When a certified MBE or WBE firm bids on a contract that contains MBE and WBE goals, the firm is responsible for meeting the goals or making good faith efforts to meet the goals, just like any other bidder. In most cases, a MBE or WBE bidder on a contract will meet one of the goals by virtue of the work it performs on the contract with its own forces. However, all the work that is performed by the MBE or WBE bidder and any other similarly certified subcontractors will count toward the goal. The MBE or WBE bidder shall list itself along with any MBE or WBE subcontractors, if any, in order to receive credit toward the goals.

For example, on a proposed contract, the WBE goal is 10%, and the MBE goal is 8%. A WBE bidder puts in a bid where they will perform 40% of the contract work and have a WBE subcontractor which will perform another 5% of the work. Together the two WBE firms submit on the *Listing of MBE and WBE Subcontractors* a value of 45% of the contract which fulfills the WBE goal. The 8% MBE goal shall be obtained through MBE participation with MBE certified subcontractors or documented through a good faith effort. It should be noted that you cannot combine the two goals to meet an overall value. The two goals shall remain separate.

MBE/WBE prime contractors shall also follow Sections A or B listed under *Listing of MBE/WBE Subcontractors* just as a non-MBE/WBE bidder would.

### **Written Documentation – Letter of Intent**

The bidder shall submit written documentation for each MBE/WBE that will be used to meet the MBE and WBE goals of the contract, indicating the bidder's commitment to use the MBE/WBE in the contract. This documentation shall be submitted on the Department's form titled *Letter of Intent*.

The documentation shall be received in the office of the Engineer no later than 2:00 p.m. of the fifth calendar day following opening of bids, unless the fifth day falls on Saturday, Sunday or an official state holiday. In that situation, it is due in the office of the Engineer no later than 10:00 a.m. on the next official state business day.

If the bidder fails to submit the Letter of Intent from each committed MBE and WBE to be used toward the MBE and WBE goals, or if the form is incomplete (i.e. both signatures are not present), the MBE/WBE participation will not count toward meeting the MBE/WBE goal. If the lack of this participation drops the commitment below either the MBE or WBE goal, the Contractor shall submit evidence of good faith efforts for the goal not met, completed in its entirety, to the Engineer no later than 2:00 p.m. of the eighth calendar day

following opening of bids, unless the eighth day falls on Saturday, Sunday or an official state holiday. In that situation, it is due in the office of the Engineer no later than 10:00 a.m. on the next official state business day.

### **Banking MBE/WBE Credit**

If the committed MBE/WBE participation submitted by Letter of Intent exceeds the algebraic sum of the MBE or WBE goal by \$1,000 or more, the excess will be placed on deposit by the Department for future use by the bidder. Separate accounts will be maintained for MBE and WBE participation and these may accumulate for a period not to exceed 24 months.

When the apparent lowest responsive bidder fails to submit sufficient participation by MBE firms to meet the contract goal, as part of the good faith effort, the Department will consider allowing the bidder to withdraw funds to meet the MBE goal as long as there are adequate funds available from the bidder's MBE bank account.

When the apparent lowest responsive bidder fails to submit sufficient participation by WBE firms to meet the contract goal, as part of the good faith effort, the Department will consider allowing the bidder to withdraw funds to meet the WBE goal as long as there are adequate funds available from the bidder's WBE bank account.

### **Submission of Good Faith Effort**

If the bidder fails to meet or exceed either the MBE or the WBE goal, the apparent lowest responsive bidder shall submit to the Department documentation of adequate good faith efforts made to reach that specific goal(s).

One complete set and 2 copies of this information shall be received in the office of the Engineer no later than 2:00 p.m. of the fifth calendar day following opening of bids, unless the fifth day falls on Saturday, Sunday or an official state holiday. In that situation, it is due in the office of the Engineer no later than 10:00 a.m. on the next official state business day.

Note: Where the information submitted includes repetitious solicitation letters, it will be acceptable to submit a representative letter along with a distribution list of the firms that were solicited. Documentation of MBE/WBE quotations shall be a part of the good faith effort submittal. This documentation may include written subcontractor quotations, telephone log notations of verbal quotations, or other types of quotation documentation.

### **Consideration of Good Faith Effort for Projects with MBE/WBE Goals More Than Zero**

Adequate good faith efforts mean that the bidder took all necessary and reasonable steps to achieve the goal which, by their scope, intensity, and appropriateness, could reasonably be expected to obtain sufficient MBE/WBE participation. Adequate good faith efforts also mean that the bidder actively and aggressively sought MBE/WBE participation. Mere *pro forma* efforts are not considered good faith efforts.

The Department will consider the quality, quantity, and intensity of the different kinds of efforts a bidder has made. Listed below are examples of the types of actions a bidder will take in making a good faith effort to meet the goals and are not intended to be exclusive or exhaustive, nor is it intended to be a mandatory checklist.

- (A) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising, written notices, use of verifiable electronic means through the use of the NCDOT Directory of Transportation Firms) the interest of all certified MBEs/WBEs that are also prequalified subcontractors. The bidder must solicit this interest within at least 10 days prior to bid opening to allow the MBEs/WBEs to respond to the solicitation. Solicitation shall provide the opportunity to MBEs/WBEs within the Division and surrounding Divisions where the project is located. The bidder must determine

with certainty if the MBEs/WBEs are interested by taking appropriate steps to follow up initial solicitations.

- (B) Selecting portions of the work to be performed by MBEs/WBEs in order to increase the likelihood that the MBE and WBE goals will be achieved.
  - (1) Where appropriate, break out contract work items into economically feasible units to facilitate MBE/WBE participation, even when the prime contractor might otherwise prefer to perform these work items with its own forces.
  - (2) Negotiate with subcontractors to assume part of the responsibility to meet the contract MBE/WBE goals when the work to be sublet includes potential for MBE/WBE participation (2<sup>nd</sup> and 3<sup>rd</sup> tier subcontractors).
- (C) Providing interested certified MBEs/WBEs that are also prequalified subcontractors with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.
- (D)
  - (1) Negotiating in good faith with interested MBEs/WBEs. It is the bidder's responsibility to make a portion of the work available to MBE/WBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available MBE/WBE subcontractors and suppliers, so as to facilitate MBE/WBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of MBEs/WBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for MBEs/WBEs to perform the work.
  - (2) A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including MBE/WBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using MBEs/WBEs is not in itself sufficient reason for a bidder's failure to meet the contract MBE or WBE goals, as long as such costs are reasonable. Also, the ability or desire of a prime contractor to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Bidding contractors are not, however, required to accept higher quotes from MBEs/WBEs if the price difference is excessive or unreasonable.
- (E) Not rejecting MBEs/WBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The bidder's standing within its industry, membership in specific groups, organizations, or associates and political or social affiliations (for example, union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the bidder's efforts to meet the project goal.
- (F) Making efforts to assist interested MBEs/WBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or bidder.
- (G) Making efforts to assist interested MBEs/WBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.
- (H) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; Federal, State, and local minority/women business assistance offices; and other

organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of MBEs/WBEs. Contact within 7 days from the bid opening the Business Opportunity and Work Force Development Unit at [DBE@ncdot.gov](mailto:DBE@ncdot.gov) to give notification of the bidder's inability to get MBE or WBE quotes.

- (I) Any other evidence that the bidder submits which shows that the bidder has made reasonable good faith efforts to meet the MBE and WBE goal.

In addition, the Department may take into account the following:

- (1) Whether the bidder's documentation reflects a clear and realistic plan for achieving the MBE and WBE goals.
- (2) The bidders' past performance in meeting the MBE and WBE goals.
- (3) The performance of other bidders in meeting the MBE and WBE goals. For example, when the apparent successful bidder fails to meet the goals, but others meet it, you may reasonably raise the question of whether, with additional reasonable efforts the apparent successful bidder could have met the goals. If the apparent successful bidder fails to meet the MBE and WBE goals, but meets or exceeds the average MBE and WBE participation obtained by other bidders, the Department may view this, in conjunction with other factors, as evidence of the apparent successful bidder having made a good faith effort.

If the Department does not award the contract to the apparent lowest responsive bidder, the Department reserves the right to award the contract to the next lowest responsive bidder that can satisfy to the Department that the MBE and WBE goals can be met or that an adequate good faith effort has been made to meet the MBE and WBE goals.

### **Non-Good Faith Appeal**

The Engineer will notify the contractor verbally and in writing of non-good faith. A contractor may appeal a determination of non-good faith made by the Goal Compliance Committee. If a contractor wishes to appeal the determination made by the Committee, they shall provide written notification to the Engineer. The appeal shall be made within 2 business days of notification of the determination of non-good faith.

### **Counting MBE/WBE Participation Toward Meeting MBE/WBE Goals**

- (A) Participation

The total dollar value of the participation by a committed MBE/WBE will be counted toward the contract goal requirements. The total dollar value of participation by a committed MBE/WBE will be based upon the value of work actually performed by the MBE/WBE and the actual payments to MBE/WBE firms by the Contractor.

- (B) Joint Checks

Prior notification of joint check use shall be required when counting MBE/WBE participation for services or purchases that involves the use of a joint check. Notification shall be through submission of Form JC-1 (*Joint Check Notification Form*) and the use of joint checks shall be in accordance with the Department's Joint Check Procedures.

(C) Subcontracts (Non-Trucking)

A MBE/WBE may enter into subcontracts. Work that a MBE subcontracts to another MBE firm may be counted toward the MBE contract goal requirement. The same holds for work that a WBE subcontracts to another WBE firm. Work that a MBE subcontracts to a non-MBE firm does not count toward the MBE contract goal requirement. Again, the same holds true for the work that a WBE subcontracts to a non-WBE firm. If a MBE or WBE contractor or subcontractor subcontracts a significantly greater portion of the work of the contract than would be expected on the basis of standard industry practices, it shall be presumed that the MBE or WBE is not performing a commercially useful function. The MBE/WBE may present evidence to rebut this presumption to the Department. The Department's decision on the rebuttal of this presumption may be subject to review by the Office of Inspector General, NCDOT.

(D) Joint Venture

When a MBE or WBE performs as a participant in a joint venture, the Contractor may count toward its contract goal requirement a portion of the total value of participation with the MBE or WBE in the joint venture, that portion of the total dollar value being a distinct clearly defined portion of work that the MBE or WBE performs with its forces.

(E) Suppliers

A contractor may count toward its MBE or WBE requirement 60 percent of its expenditures for materials and supplies required to complete the contract and obtained from a MBE or WBE regular dealer and 100 percent of such expenditures from a MBE or WBE manufacturer.

(F) Manufacturers and Regular Dealers

A contractor may count toward its MBE or WBE requirement the following expenditures to MBE/WBE firms that are not manufacturers or regular dealers:

- (1) The fees or commissions charged by a MBE/WBE firm for providing a *bona fide* service, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the performance of a DOT-assisted contract, provided the fees or commissions are determined to be reasonable and not excessive as compared with fees and commissions customarily allowed for similar services.
- (2) With respect to materials or supplies purchased from a MBE/WBE, which is neither a manufacturer nor a regular dealer, count the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site (but not the cost of the materials and supplies themselves), provided the fees are determined to be reasonable and not excessive as compared with fees customarily allowed for similar services.

**Commercially Useful Function**

(A) MBE/WBE Utilization

The Contractor may count toward its contract goal requirement only expenditures to MBEs and WBEs that perform a commercially useful function in the work of a contract. A MBE/WBE performs a commercially useful function when it is responsible for execution of the work of the contract and is

carrying out its responsibilities by actually performing, managing, and supervising the work involved. To perform a commercially useful function, the MBE/WBE shall also be responsible with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material and installing (where applicable) and paying for the material itself. To determine whether a MBE/WBE is performing a commercially useful function, the Department will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the contract is commensurate with the work it is actually performing and the MBE/WBE credit claimed for its performance of the work, and any other relevant factors.

(B) MBE/WBE Utilization in Trucking

The following factors will be used to determine if a MBE or WBE trucking firm is performing a commercially useful function:

- (1) The MBE/WBE shall be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there shall not be a contrived arrangement for the purpose of meeting the MBE or WBE goal.
- (2) The MBE/WBE shall itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
- (3) The MBE/WBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs.
- (4) The MBE may subcontract the work to another MBE firm, including an owner-operator who is certified as a MBE. The same holds true that a WBE may subcontract the work to another WBE firm, including an owner-operator who is certified as a WBE. When this occurs, the MBE or WBE who subcontracts work receives credit for the total value of the transportation services the subcontracted MBE or WBE provides on the contract. It should be noted that every effort shall be made by MBE and WBE contractors to subcontract to the same certification (i.e., MBEs to MBEs and WBEs to WBEs), in order to fulfill the goal requirement. This, however, may not always be possible due to the limitation of firms in the area. If the MBE or WBE firm shows a good faith effort has been made to reach out to similarly certified transportation service providers and there is no interest or availability, and they can get assistance from other certified providers, the Engineer will not hold the prime liable for meeting the goal.
- (5) The MBE/WBE may also subcontract the work to a non-MBE/WBE firm, including from an owner-operator. The MBE/WBE who subcontracts the work to a non-MBE/WBE is entitled to credit for the total value of transportation services provided by the non-MBE/WBE subcontractor not to exceed the value of transportation services provided by MBE/WBE-owned trucks on the contract. Additional participation by non-MBE/WBE subcontractors receives credit only for the fee or commission it receives as a result of the subcontract arrangement. The value of services performed under subcontract agreements between the MBE/WBE and the Contractor will not count towards the MBE/WBE contract requirement.
- (6) A MBE/WBE may lease truck(s) from an established equipment leasing business open to the general public. The lease must indicate that the MBE/WBE has exclusive use of and control over the truck. This requirement does not preclude the leased truck from working for others during the term of the lease with the consent of the MBE/WBE, so long as the lease gives the

MBE/WBE absolute priority for use of the leased truck. This type of lease may count toward the MBE/WBE's credit as long as the driver is under the MBE/WBE's payroll.

- (7) Subcontracted/leased trucks shall display clearly on the dashboard the name of the MBE/WBE that they are subcontracted/leased to and their own company name if it is not identified on the truck itself. Magnetic door signs are not permitted.

### **MBE/WBE Replacement**

When a Contractor has relied on a commitment to a MBE or WBE firm (or an approved substitute MBE or WBE firm) to meet all or part of a contract goal requirement, the contractor shall not terminate the MBE/WBE for convenience. This includes, but is not limited to, instances in which the Contractor seeks to perform the work of the terminated subcontractor with another MBE/WBE subcontractor, a non-MBE/WBE subcontractor, or with the Contractor's own forces or those of an affiliate. A MBE/WBE may only be terminated after receiving the Engineer's written approval based upon a finding of good cause for the termination. The prime contractor must give the MBE/WBE firm five (5) calendar days to respond to the prime contractor's notice of termination and advise the prime contractor and the Department of the reasons, if any, why the firm objects to the proposed termination of its subcontract and why the Department should not approve the action.

All requests for replacement of a committed MBE/WBE firm shall be submitted to the Engineer for approval on Form RF-1 (*Replacement Request*). If the Contractor fails to follow this procedure, the Contractor may be disqualified from further bidding for a period of up to 6 months.

The Contractor shall comply with the following for replacement of a committed MBE/WBE:

#### **(A) Performance Related Replacement**

When a committed MBE is terminated for good cause as stated above, an additional MBE that was submitted at the time of bid may be used to fulfill the MBE commitment. The same holds true if a committed WBE is terminated for good cause, an additional WBE that was submitted at the time of bid may be used to fulfill the WBE goal. A good faith effort will only be required for removing a committed MBE/WBE if there were no additional MBEs/WBEs submitted at the time of bid to cover the same amount of work as the MBE/WBE that was terminated.

If a replacement MBE/WBE is not found that can perform at least the same amount of work as the terminated MBE/WBE, the Contractor shall submit a good faith effort documenting the steps taken. Such documentation shall include, but not be limited to, the following:

- (1) Copies of written notification to MBEs/WBEs that their interest is solicited in contracting the work defaulted by the previous MBE/WBE or in subcontracting other items of work in the contract.
- (2) Efforts to negotiate with MBEs/WBEs for specific subbids including, at a minimum:
  - (a) The names, addresses, and telephone numbers of MBEs/WBEs who were contacted.
  - (b) A description of the information provided to MBEs/WBEs regarding the plans and specifications for portions of the work to be performed.
- (3) A list of reasons why MBE/WBE quotes were not accepted.



- (4) Efforts made to assist the MBEs/WBEs contacted, if needed, in obtaining bonding or insurance required by the Contractor.

(B) Decertification Replacement

- (1) When a committed MBE/WBE is decertified by the Department after the SAF (*Subcontract Approval Form*) has been received by the Department, the Department will not require the Contractor to solicit replacement MBE/WBE participation equal to the remaining work to be performed by the decertified firm. The participation equal to the remaining work performed by the decertified firm will count toward the contract goal requirement.
- (2) When a committed MBE/WBE is decertified prior to the Department receiving the SAF (*Subcontract Approval Form*) for the named MBE/WBE firm, the Contractor shall take all necessary and reasonable steps to replace the MBE/WBE subcontractor with another similarly certified MBE/WBE subcontractor to perform at least the same amount of work to meet the MBE/WBE goal requirement. If a MBE/WBE firm is not found to do the same amount of work, a good faith effort must be submitted to NCDOT (see A herein for required documentation).

### **Changes in the Work**

When the Engineer makes changes that result in the reduction or elimination of work to be performed by a committed MBE/WBE, the Contractor will not be required to seek additional participation. When the Engineer makes changes that result in additional work to be performed by a MBE/WBE based upon the Contractor's commitment, the MBE/WBE shall participate in additional work to the same extent as the MBE/WBE participated in the original contract work.

When the Engineer makes changes that result in extra work, which has more than a minimal impact on the contract amount, the Contractor shall seek additional participation by MBEs/WBEs unless otherwise approved by the Engineer.

When the Engineer makes changes that result in an alteration of plans or details of construction, and a portion or all of the work had been expected to be performed by a committed MBE/WBE, the Contractor shall seek participation by MBEs/WBEs unless otherwise approved by the Engineer.

When the Contractor requests changes in the work that result in the reduction or elimination of work that the Contractor committed to be performed by a MBE/WBE, the Contractor shall seek additional participation by MBEs/WBEs equal to the reduced MBE/WBE participation caused by the changes.

### **Reports and Documentation**

A SAF (*Subcontract Approval Form*) shall be submitted for all work which is to be performed by a MBE/WBE subcontractor. The Department reserves the right to require copies of actual subcontract agreements involving MBE/WBE subcontractors.

When using transportation services to meet the contract commitment, the Contractor shall submit a proposed trucking plan in addition to the SAF. The plan shall be submitted prior to beginning construction on the project. The plan shall include the names of all trucking firms proposed for use, their certification type(s), the number of trucks owned by the firm, as well as the individual truck identification numbers, and the line item(s) being performed.

Within 30 calendar days of entering into an agreement with a MBE/WBE for materials, supplies or services, not otherwise documented by the SAF as specified above, the Contractor shall furnish the Engineer a copy of the agreement. The documentation shall also indicate the percentage (60% or 100%) of expenditures claimed for MBE/WBE credit.

### **Reporting Minority and Women Business Enterprise Participation**

The Contractor shall provide the Engineer with an accounting of payments made to all MBE and WBE firms, including material suppliers and contractors at all levels (prime, subcontractor, or second tier subcontractor). This accounting shall be furnished to the Engineer for any given month by the end of the following month. Failure to submit this information accordingly may result in the following action:

- (A) Withholding of money due in the next partial pay estimate; or
- (B) Removal of an approved contractor from the prequalified bidders' list or the removal of other entities from the approved subcontractors list.

While each contractor (prime, subcontractor, 2nd tier subcontractor) is responsible for accurate accounting of payments to MBEs/WBEs, it shall be the prime contractor's responsibility to report all monthly and final payment information in the correct reporting manner.

Failure on the part of the Contractor to submit the required information in the time frame specified may result in the disqualification of that contractor and any affiliate companies from further bidding until the required information is submitted.

Failure on the part of any subcontractor to submit the required information in the time frame specified may result in the disqualification of that contractor and any affiliate companies from being approved for further work on future projects until the required information is submitted.

Contractors reporting transportation services provided by non-MBE/WBE lessees shall evaluate the value of services provided during the month of the reporting period only.

At any time, the Engineer can request written verification of subcontractor payments.

The Contractor shall report the accounting of payments through the Department's DBE Payment Tracking System.

### **Failure to Meet Contract Requirements**

Failure to meet contract requirements in accordance with Subarticle 102-15(J) of the *2012 Standard Specifications* may be cause to disqualify the Contractor.

### **LOCATING EXISTING UNDERGROUND UTILITIES:**

(3-20-12)

105

SPI G115

Revise the *2012 Standard Specifications* as follows:

**Page 1-43, Article 105-8, line 28, after the first sentence, add the following:**

Identify excavation locations by means of pre-marking with white paint, flags, or stakes or provide a specific written description of the location in the locate request.

**RESOURCE CONSERVATION AND ENV. SUSTAINABLE PRACTICES:**

(5-21-13) (Rev. 5-19-15)

104-13

SP1 G118

In accordance with North Carolina Executive Order 156, NCGS 130A-309.14(3), and NCGS 136-28.8, it is the objective of the Department to aid in the reduction of materials that become a part of our solid waste stream, to divert materials from landfills, to find ways to recycle and reuse materials, to consider and minimize, where economically feasible, the environmental impacts associated with agency land use and acquisition, construction, maintenance and facility management for the benefit of the Citizens of North Carolina.

To achieve the mission of reducing environmental impacts across the state, the Department is committed to supporting the efforts to initiate, develop and use products and construction methods that incorporate the use of recycled, solid waste products and environmentally sustainable practices in accordance with Article 104-13 of the *Standard Specifications*.

Report the quantities of reused or recycled materials either incorporated in the project or diverted from landfills and any practice that minimizes the environmental impact on the project annually on the Project Construction Reuse and Recycling Reporting Form. The Project Construction Reuse and Recycling Reporting Form and a location tool for local recycling facilities are available at:

<http://connect.ncdot.gov/resources/Environmental/Pages/North-Carolina-Recycling-Locations.aspx>.

Submit the Project Construction Reuse and Recycling Reporting Form by August 1 annually to [valuemanagementunit@ncdot.gov](mailto:valuemanagementunit@ncdot.gov). For questions regarding the form or reporting, please contact the State Value Management Engineer at 919-707-4810.

**DOMESTIC STEEL:**

(4-16-13)

106

SP1 G120

Revise the *2012 Standard Specifications* as follows:

**Page 1-49, Subarticle 106-1(B) Domestic Steel, lines 2-7,** replace the first paragraph with the following:

All steel and iron products that are permanently incorporated into this project shall be produced in the United States except minimal amounts of foreign steel and iron products may be used provided the combined material cost of the items involved does not exceed 0.1% of the total amount bid for the entire project or \$2,500, whichever is greater. If invoices showing the cost of the material are not provided, the amount of the bid item involving the foreign material will be used for calculations. This minimal amount of foreign produced steel and iron products permitted for use is not applicable to high strength fasteners. Domestically produced high strength fasteners are required.

**COOPERATION BETWEEN CONTRACTORS:**

(7-1-95)

105-7

SP1 G133

The Contractor's attention is directed to Article 105-7 of the *2012 Standard Specifications*.

NCDOT forces will be placing the final pavement markings. Contact Jeff Dunning at 252-830-3493 for coordination.

The Contractor on this project shall cooperate with the Contractor working within or adjacent to the limits of this project to the extent that the work can be carried out to the best advantage of all concerned.

**OUTSOURCING OUTSIDE THE USA:**

(9-21-04) (Rev. 5-16-06)

SP1 G150

All work on consultant contracts, services contracts, and construction contracts shall be performed in the United States of America. No work shall be outsourced outside of the United States of America.

*Outsourcing* for the purpose of this provision is defined as the practice of subcontracting labor, work, services, staffing, or personnel to entities located outside of the United States.

The North Carolina Secretary of Transportation shall approve exceptions to this provision in writing.

**IRAN DIVESTMENT ACT:**

(5-17-16)

SP01 G151

As a result of the Iran Divestment Act of 2015 (Act), Article 6E, N.C. General Statute § 147-86.55, the State Treasurer published the Final Divestment List (List) which includes the Final Divestment List-Iran, and the Parent and Subsidiary Guidance-Iran. These lists identify companies and persons engaged in investment activities in Iran and will be updated every 180 days. The List can be found at <https://www.nctreasurer.com/inside-the-department/OpenGovernment/Pages/Iran-Divestment-Act-Resources.aspx>

By submitting the Offer, the Contractor certifies that, as of the date of this bid, it is not on the then-current List created by the State Treasurer. The Contractor must notify the Department immediately if, at any time before the award of the contract, it is added to the List.

As an ongoing obligation, the Contractor must notify the Department immediately if, at any time during the contract term, it is added to the List. Consistent with § 147-86.59, the Contractor shall not contract with any person to perform a part of the work if, at the time the subcontract is signed, that person is on the then-current List.

During the term of the Contract, should the Department receive information that a person is in violation of the Act as stated above, the Department will offer the person an opportunity to respond and the Department will take action as appropriate and provided for by law, rule, or contract.

**GIFTS FROM VENDORS AND CONTRACTORS:**

(12-15-09)

107-1

SP1 G152

By Executive Order 24, issued by Governor Perdue, and *N.C.G.S. § 133-32*, it is unlawful for any vendor or contractor (i.e. architect, bidder, contractor, construction manager, design professional, engineer, landlord, offeror, seller, subcontractor, supplier, or vendor), to make gifts or to give favors to any State employee of the Governor's Cabinet Agencies (i.e. Administration, Commerce, Correction, Crime Control and Public Safety, Cultural Resources, Environment and Natural Resources, Health and Human Services, Juvenile Justice and Delinquency Prevention, Revenue, Transportation, and the Office of the Governor). This prohibition covers those vendors and contractors who:

- (A) Have a contract with a governmental agency; or
- (B) Have performed under such a contract within the past year; or
- (C) Anticipate bidding on such a contract in the future.

For additional information regarding the specific requirements and exemptions, vendors and contractors are encouraged to review Executive Order 24 and *N.C.G.S. § 133-32*.

Executive Order 24 also encouraged and invited other State Agencies to implement the requirements and prohibitions of the Executive Order to their agencies. Vendors and contractors should contact other State Agencies to determine if those agencies have adopted Executive Order 24.

**LIABILITY INSURANCE:**

(5-20-14)

SP1 G160

Revise the *2012 Standard Specifications* as follows:

**Page 1-60, Article 107-15 LIABILITY INSURANCE, line 16**, add the following as the second sentence of the third paragraph:

Prior to beginning services, all contractors shall provide proof of coverage issued by a workers' compensation insurance carrier, or a certificate of compliance issued by the Department of Insurance for self-insured subcontractors, irrespective of whether having regularly in service fewer than three employees.

**EMPLOYMENT:**

(11-15-11) (Rev. 1-17-12)

108, 102

SP1 G184

Revise the *2012 Standard Specifications* as follows:

**Page 1-20, Subarticle 102-15(O)**, delete and replace with the following:

(O) Failure to restrict a former Department employee as prohibited by Article 108-5.

**Page 1-65, Article 108-5 Character of Workmen, Methods, and Equipment, line 32**, delete all of line 32, the first sentence of the second paragraph and the first word of the second sentence of the second paragraph.

**STATE HIGHWAY ADMINISTRATOR TITLE CHANGE:**

(9-18-12)

SP1 G185

Revise the *2012 Standard Specifications* as follows:

Replace all references to "State Highway Administrator" with "Chief Engineer".

**SUBLETTING OF CONTRACT:**

(11-18-2014)

108-6

SP1 G186

Revise the *2012 Standard Specifications* as follows:

**Page 1-66, Article 108-6 Subletting of Contract, line 37**, add the following as the second sentence of the first paragraph:

All requests to sublet work shall be submitted within 30 days of the date of availability or prior to expiration of 20% of the contract time, whichever date is later, unless otherwise approved by the Engineer.

**Page 1-67, Article 108-6 Subletting of Contract, line 7**, add the following as the second sentence of the fourth paragraph:

Purchasing materials for subcontractors is not included in the percentage of work required to be performed by the Contractor. If the Contractor sublets items of work but elects to purchase material for the subcontractor, the value of the material purchased will be included in the total dollar amount considered to have been sublet.

# STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION



## DIVISION TWO

County: CARTERET  
 WBS Element: 51213.031  
 State ID#: 17-17533-01A  
 Description: CARTERET COUNTY REST AREA RENOVATION  
 US 70  
 Morehead City, NC


Architect


Plumbing, Mechanical &  
Electrical Engineer

Weeks Turner Architecture, PA  
 Ginger Anderson, Architect  
 3305-109 Durham Dr.  
 Raleigh, NC 27603  
 (919) 779-9797  
 Corp . Cert. 549

Burke Design Group, PA  
 Ben Burke, PE  
 3305-109 Durham Dr.  
 Raleigh, NC 27603  
 (919) 771-1916  
 Corp. License C-2652



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US-70 Carteret County

Rest Area Building

51213.031

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US-70 Carteret County

Rest Area Building

51213.031

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## **SECTION 01026 - PAYMENT AND COMPLETION PROCEDURES**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Schedule of values.
  - 2. Payment procedures.
  - 3. Completion procedures.
- B. Related Requirements Specified Elsewhere in the Project Manual: Overhead and profit distribution.

#### **1.02 CONTRACT CONDITIONS**

- A. See the conditions of the contract for additional requirements.
- B. Progress payments will be made on or about the 25<sup>th</sup> of each month.
- C. The Architect/Engineer will act upon the Contractor's application for payment within 5 days after receipt.
- D. The Owner will act upon the application for payment within 15 days after receipt.
- E. No payment will be made for materials or equipment stored off site unless specifically approved in advance, in writing by the owner. Submit copy of the owner's agreement to pay for such materials and equipment with the application for payment covering such materials and equipment.
- F. Payments may be withheld if the contractor fails to make dated submittals within the time periods specified.

#### **1.03 DEFINITIONS**

- A. Final Completion: The stage at which all incomplete and incorrect work has been completed or corrected in accordance with the contract documents.
- B. List of Incomplete Work: A comprehensive list of items to be completed or corrected, prepared by the Designer/Owner/Contractor for the purpose of obtaining certification of substantial completion. This list is also referred to as a "Pre-Final and Final Punch List."
- C. Schedule of Values: A detailed breakdown of the contract sum into individual cost items, which will serve as the basis for evaluation of applications for progress payments during construction.
- D. Substantial Completion: The time at which the work, or a portion of the work which the owner agrees to accept separately, is sufficiently complete in accordance with the contract documents so that the owner can occupy or use the work for its intended purpose.
- E. Time and Material Work: Work which will be paid for on the basis of the actual cost of the work, including materials, labor, equipment, and other costs as defined elsewhere, as documented by detailed records. This basis is also referred to using the terms "cost-plus," "cost of the work," "force account," and similar terms.

#### **1.04 SUBMITTALS**

- A. Schedule of Values: First application for payment will not be reviewed without schedule of values.
  - 1. Submit in size not larger than 8-1/2 by 11 inches.
  - 2. Submit 5 copies.
  - 3. Identify with:
    - a. Project name, Project number, Architect's name, Owner's name, Contractor's name and address, and Submittal date.

- B. Applications for Progress Payments: Submit sufficiently in advance of date established for the progress payment to allow for the processing indicated.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 – EXECUTION**

### **3.01 SCHEDULE OF VALUES**

- A. Prepare a schedule of values prior to the first application for payment.
- B. Schedule of Values: Break costs down into line items which will be comparable with line items in applications for payment.
1. Coordinate line items in the schedule of values with portions of the contract documents which identify units or subdivisions of work; provide cross-referencing if necessary to clarify.
    - a. Specifically, correlate with the project manual table of contents.
  2. Divide major subcontracts into individual cost items.
  3. Where applications for payment are likely to include products purchased or fabricated but not yet installed, provide individual line items for material cost, installation cost, and other applicable phases of completion.
  4. Include the following information for each line item, using AIA G703, Continuation Sheet.
    - a. Item name.
    - b. Applicable specification section.
    - c. Dollar value, rounded off to the nearest whole dollar (with the total equal to the contract sum).
    - d. Proportion of the contract sum represented by this item, to the nearest one-hundredth percent (with the total adjusted to 100 percent).
  5. Provide the following supporting data for each line item:
    - a. Subcontractor's name.
    - b. Manufacturer or fabricator's name.
    - c. Supplier's name.
- C. Submit schedule of values not later than 10 days prior to submittal of first application for payment.
- D. The Architect/Engineer will notify the contractor if schedule is not satisfactory; revise and resubmit acceptable schedule.
- E. Submit a revised schedule of values when modifications change the contract sum or change individual line items.
1. Make each modification a new line item.
  2. Show the following information for each line item:
    - a. All information required for original submittal.
    - b. Identification of modifications which have affected its value.
  3. Submit prior to next application for payment.

### **3.02 APPLICATIONS FOR PAYMENT**

- A. Application for Payment will be through hicams.
- B. Provide the following information with every application for payment which involves work completed on a time and material basis:
1. Detailed records of work done, including:
    - a. Dates and times work was performed, and by whom.
    - b. Time records and wage rates paid.
    - c. Invoices and receipts for products.
  2. Provide similar detailed records for subcontracts.

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- C. Transmit application for payment with a transmittal form itemizing supporting documents attached.

### **3.03 FIRST PAYMENT PROCEDURE**

- A. The first application for payment will not be reviewed until the following submittals have been received:
  - 1. Schedule of values.
  - 2. List of subcontractors, principal suppliers, and fabricators.
  - 3. Contractor's construction schedule. Monthly Progress Schedules are required, see Section 01200.
  - 4. Names of the contractor's principal staff assigned to the project.
  - 5. All submittals specified to occur prior to first application for payment or prior to first payment.

### **3.04 SUBSTANTIAL COMPLETION PROCEDURES**

- A. The architect will perform a Pre-Final Inspection with the contractor two weeks before substantial completion inspection, upon request of the contractor. Plumbing, Mechanical, & Electrical subcontractors shall be present for all Final Inspections.
- B. The architect will perform a Final Inspection with the contractor for substantial completion and verification that the Pre-Final Inspection Punchlist is complete, upon request of the contractor.
  - 1. Only one certificate of substantial completion will be issued, for the entire project.
- C. Submit the following with application for payment following substantial completion:
  - 1. Certificate of Substantial Completion; use AIA original current editions of G704.
  - 4. Final Inspection list of incomplete work.
  - 5. Other data required by the contract documents.

### **3.05 FINAL COMPLETION PROCEDURES**

- A. Request for Final Inspection and final application for payment may coincide.
- B. The architect/engineer will perform inspection for final completion, upon request of the contractor.
  - 1. Submit the following with request for inspection:
    - a. Previous inspection lists indicating completion of all items.
    - b. If any items cannot be completed, obtain prior approval of such delay.
- C. Do not submit request for Final Inspection until the following activities have been completed:
  - 1. Completion of all work, Pre-Final Inspection Punch List, except those items agreed upon by the owner.
  - 2. Final cleaning.
  - 3. All activities specified to occur between substantial completion and final completion.
- D. Do not submit request for final inspection until the following submittals have been completed:
  - 1. Startup reports; HVAC balance and test reports.
  - 2. Operation and maintenance data. Demonstration reports. Instruction reports.
  - 3. Water bacterial test report of new domestic water supply.
  - 4. Final Electrical Inspection and certification by the State Construction Office electrical inspector.
  - 5. Project record documents, record drawings or as-built drawings.
  - 6. All other outstanding specified submittals.
- E. Submit the following with the final application for payment:
  - 1. Certified copy of the previous list of items to be completed or corrected, stating that each has been completed or otherwise resolved for acceptance.
  - 2. Contractor's Affidavit of Payment of Debts and Claims; use AIA original current editions of G706
  - 3. Contractor's Affidavit of Release of Liens; use AIA original current editions of G706A.
  - 4. Consent of surety to final payment; use AIA original current editions of G707.

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5. Final liquidated damages statement.
6. Certification that financial obligations to governing authorities and public utilities have been fulfilled.
7. Description of unsettled claims.
8. Other data required by the contract documents.

**END OF SECTION 01026**

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## **SECTION 01031 – ALTERNATES AND UNIT PRICES**

### **PART 1 - GENERAL**

#### **1.01 ALTERNATE LIST**

- A. **Alternate No. 1:**  
Art Work Wall-Tile See sheet A1.11
- B. **Alternate No. 2:**  
Art Work Wall-Tile-See sheet A1.12
- C. **Alternate No. 3:**  
Art Work Wall-Tile-See sheet A1.12

#### **1.02 UNIT PRICE LIST**

- A. **Unit Price No. 1:**  
Remove and replace damaged 2x floor framing (price per lf)
- B. **Unit Price No. 2**  
Remove and replaced damaged subfloor sheathing (price per sf)
- C. **Unit Price No. 3**  
Remove and replaced damaged 2x wood bottom plate (price per lf)
- D. **Unit Price No. 4**  
Remove and replaced damaged 2x wood stud (price per lf)

#### **1.03 CONTRACT CONSIDERATIONS**

- A. Alternates and Unit prices:
  - 1. Include in the Alternate and Unit price all materials, parts, and accessories required for a complete installation, regardless of whether they are mentioned in the alternate and unit price description.
  - 2. Voluntary alternates will not be considered in evaluation of bids.
  - 3. The owner reserves the right to accept any or all alternates in any order or combination.
  - 4. The owner reserves the right to accept no alternates.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION (NOT USED)**

## **END OF SECTION 01230**

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# SECTION 01100- COMPENSATION FOR GENERAL CONSTRUCTION

HIGHWAY US-70  
REST AREA AND VISTOR'S CENTER  
AUGUST 2017  
CARTERET COUNTY, NORTH CAROLINA

## 1.1 COMPENSATION

- A. The work of furnishing all materials and constructing/renovating the existing Rest Area Building, the Visitor's center, deck and storage building in accordance with the plans and specifications, completed and accepted, will be paid for at the contract lump sum price for the "General Construction of Rest Area Building". Such price and payment will be full compensation for all work included in construction documents for renovating the Rest Area Building, Visitor's Center, Storage building and picnic shelters, including but not limited to furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work. Payment will be made under:

"General Construction of Rest Area Building".....Lump Sum

For alternates and unit prices-see spec section 01031.

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HIGHWAY US-70  
REST AREA AND VISTOR'S CENTER  
AUGUST 2017  
CARTERET COUNTY, NORTH CAROLINA

DIVISION 15A- COMPENSATION FOR PLUMBING --

COMPENSATION

- A. The work of furnishing materials and constructing the Plumbing installation for the Rest Area Building in accordance with the plans and specifications, completed and accepted, will be paid for at the contract lump sum price for the "Plumbing Installation of Rest Area Building". Such price and payment will be full compensation for all work of constructing the Plumbing installation for the Rest Area Building as indicated within construction documents, including but not limited to furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work. Payment will be made under:

"Plumbing Installation of Rest Area Building".....Lump Sum



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REST AREA AND VISTOR'S CENTER  
AUGUST 2017  
CARTERET COUNTY, NORTH CAROLINA

DIVISION 15B- COMPENSATION FOR MECHANICAL

COMPENSATION

- A. The work of furnishing materials and constructing the Mechanical System for the Rest Area Building in accordance with the plans and specifications, completed and accepted, will be paid for at the contract lump sum price for the "Mechanical Installation for Rest Area Building". Such price and payment will be full compensation for all work of the Mechanical Installation for Rest Area Building, including but not limited to furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work. Payment will be made under:

"Mechanical Installation for Rest Area Building".....Lump Sum

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REST AREA AND VISTOR'S CENTER  
AUGUST 2017  
CARTERET COUNTY, NORTH CAROLINA

DIVISION 16- COMPENSATION FOR ELECTRICAL

COMPENSATION

- A. The work of furnishing materials and constructing the Electrical installation for the Rest Area Building in accordance with the plans and specifications, completed and accepted, will be paid for at the contract lump sum price for the "Electrical Installation for Rest Area Building". Such price and payment will be full compensation for all work of constructing the Electrical installation for the Rest Area Building, including but not limited to furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work. Payment will be made under:

"Electrical Installation for Rest Area Building".....Lump Sum

"Electrical Installation for Storage Building ".....Lump Sum

## **SECTION 01151 - CONSTRUCTION AND DEMOLITION MATERIALS RECYCLING REQUIREMENTS**

### **PART 1 GENERAL**

#### **1.01 SUMMARY**

- A. Section includes: Requirements and procedures for ensuring optimal diversion of demolition and construction waste materials generated by the Work from landfill disposal within the limits of the Construction Schedule and Contract Sum.
  - 1. State of North Carolina Executive Order 156, Section 1.b, states that "...all state agencies are to maximize their efforts to...reduce and recycle material recoverable from solid waste originating...from the construction and renovation of new facilities..."
  - 2. The Waste Reduction Goal of this Contract is that a minimum of 50% by weight of the construction and demolition materials generated in the Work be diverted from landfill disposal through a combination of re-use and recycling activities.
  - 3.. Requirements for submittal of Contractor's Construction Waste and Recycling Plan prior to the commencement of the Work.
  - 4. Contractor's quantitative reports for construction waste materials as a condition of approval of progress payments submitted to the Architect

#### **1.02 DEFINITIONS**

- A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial, and industrial waste, resulting from construction, remodeling, repair, and demolition operations.
- B. Construction and Demolition Debris: Building materials and solid waste resulting from construction, remodeling, repair, cleanup, or demolition operations that are not hazardous. This term includes, but is not limited to, asphalt concrete, Portland cement concrete, brick, lumber, gypsum wallboard, cardboard and other associated packaging, roofing material, ceramic tile, carpeting, carpet pad, ceiling tile, plastic pipe, other plastic material, vinyl flooring, copper pipe, and steel. This will also include other jobsite materials such as cardboard packaging, sheet vinyl, plastic bottles, white paper, and aluminum cans.
- C. C&D Recycling Center. A facility that receives C&D material that has been separated for reuse. Recycling facilities are often part of the overall County waste management facilities.
- D. Disposal. Final deposition of construction and demolition material
- E. Mixed Debris Recycling Facility: A processing facility that accepts loads of commingled construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing the non-recyclable residual materials.
- F. Recycling: The process of sorting, cleansing, treating and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.
- G. Reuse. The use, in the same or similar form as it was produced, of a material which might otherwise be discarded.
- H. Source-Separated: Materials, including commingled recyclables, that have been separated or kept separate from the solid waste stream at the point of generation, for the purpose of additional sorting or processing of those materials for reuse or recycling in order to return them to the economic mainstream in the form of raw materials for new, reused, or reconstituted products which meet the quality standards necessary to be used in the marketplace.
- I. Waste Hauler: A company that possesses a valid permit from the [local waste management authority to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal in [the locality].

### 1.03 SUBMITTALS

- A. Contractor's Construction Waste and Recycling Plan
1. Review Contract Documents and estimate the types and quantities of materials under the Work that are anticipated to be feasible for on-site processing, source separation for re-use or recycling. Indicate the procedures that will be implemented in this program to effect jobsite source separation, such as, identifying a convenient location where dumpsters would be located, putting signage to identify materials to be placed in dumpsters, etc.
  2. Prior to commencing the Work, submit Contractor's Construction Waste and Recycling Plan. Submit in format provided (**Section 01151A**). The Plan must include, but is not limited to the following:
    - a. Contractor's name and project identification information;
    - b. Procedures to be used;
    - c. Materials to be re-used and recycled;
    - d. Estimated quantities of materials;
    - e. Names and locations of re-use and recycling facilities/sites;
    - f. Tonnage calculations that demonstrate that Contractor will re-use and recycle a minimum 50% by weight of the construction waste materials generated in the Work.
    - g. Cost of local tip fees for non-recycled material/ton
    - h. Cost or revenue generated from recycled material, per category, per ton (note: cost and revenue are to be managed by the General Contractor as part of the Work; tonnage, cost, and savings information are to be provided to the Architect for tracking purposes only)
  2. Contractor's Construction Waste and Recycling Plan must be approved by the Architect prior to the start of Work.
  3. Contractor's Construction Waste and Recycling Plan will not otherwise relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.
- B. Contractor's Reuse, Recycling, and Disposal Report
1. Submit Contractor's Reuse, Recycling, and Disposal Report on the form provided (**Section 01151B**) with each application for progress payment. Failure to submit the form and its supporting documentation will render the application for progress payment incomplete and delay progress payments. If applicable, include manifests, weight tickets, receipts, and invoices specifically identifying the Project for re-used and recycled materials:
    - a. Reuse of building materials or salvage items on site
    - b. Salvaging building materials for reuse
    - c. Recycling source separated materials on site, with approval
    - d. Recycling source separated material at an off site recycling center
    - e. Delivery of soils or mixed inerts to an inerts landfill for disposal (inert fill).
    - f. Disposal at a landfill or transfer station (where no recycling takes place).
    - g. Other (describe).

Contractor's Reuse, Recycling, and Disposal Report must quantify all materials generated in the Work, disposed in landfills, or diverted from disposal through recycling. Indicate zero (0) if there is no quantity to report for a type of material. As indicated on the form:

1. Report disposal or recycling either in tons or in cubic yards: if scales are available at disposal or recycling facility, report in tons; otherwise, report in cubic yards. Report in units for salvage items when no tonnage or cubic yard measurement is feasible.
2. Indicate locations to which materials are delivered for reuse, salvage, recycling, accepted as daily cover, inert backfill, or disposal in landfills or transfer stations.

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3. Provide legible copies of weigh tickets, receipts, or invoices that specifically identify the project generating the material. Said documents must be from recyclers and/or disposal site operators that can legally accept the materials for the purpose of re-use, recycling, or disposal.
  - a. Indicate project title, project number, progress payment number, name of the company completing the Contractor's Report and compiling backup documentation, the printed name, signature, and daytime phone number of the person completing the form, the beginning and ending dates of the period covered on the Contractor's Report, and the date that the Contractor's Report is completed.
4. NCDOT General Services Division will provide a list of waste recycling sites, sorted by County and by Highway Division. It is the responsibility of the General Contractor to confirm the locations and manage the waste material.

## **PART 2 PRODUCTS (not used)**

## **PART 3 EXECUTION**

### **3.01 SALVAGE, RE-USE, RECYCLING AND PROCEDURES**

- A. Identify re-use, salvage, and recycling facilities.
- B. Develop and implement procedures to re-use, salvage, and recycle new construction and excavation materials, based on the Contract Documents, the Contractor's Construction Waste and Recycling Plan, estimated quantities of available materials, and availability of recycling facilities. Procedures may include on-site recycling, source separated recycling, and/or mixed debris recycling efforts.
  1. Identify materials that are feasible for salvage, determine requirements for site storage, and transportation of materials to a salvage facility.
  2. Source separate new construction, excavation and demolition materials including, but not limited to the following types:
    - a. Asphalt.
    - b. Concrete, concrete block, slump stone (decorative concrete block), and rocks.
    - c. Gypsum wallboard
    - d. Green materials (i.e. tree trimmings and land clearing debris).
    - e. Metal (ferrous and non-ferrous).
    - f. Miscellaneous Construction Debris.
    - g. Paper or cardboard.
    - h. Red Clay Brick.  
Reuse or Salvage Materials
    - i. Soils.  
Wire and Cable.
    - j. Wood studs
    - k. Plastic pipe
    - l. Ceiling tile
    - m. Ceramic tile
    - n. Carpet
    - o. Vinyl flooring
    - p. Other
  3. Miscellaneous Construction Debris: Develop and implement a program to transport loads of mixed (commingled) new construction materials that cannot be feasibly source separated to a mixed materials recycling facility.

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**3.02 DISPOSAL OPERATIONS AND WASTE HAULING**

- A. Legally transport and dispose of materials that cannot be delivered to a source separated or mixed recycling facility to a transfer station or disposal facility that can legally accept the materials for the purpose of disposal.
- B. Use a permitted waste hauler or Contractor's trucking services and personnel. To confirm valid permitted status of waste haulers, contact the local solid waste authority.
- C. Become familiar with the conditions for acceptance of new construction, excavation and demolition materials at recycling facilities, prior to delivering materials. NCDOT General Services Division will work with the General Contractor on identifying sites that will accept recycled materials.
- D. Deliver to facilities that can legally accept new construction, excavation and demolition materials for purpose of re-use, recycling, composting, or disposal.
- E. Do not burn, bury or otherwise dispose of solid waste on the project job-site.

**3.03 REVENUE**

- A. Revenues or other savings obtained from recycled, re-used, or salvaged materials shall accrue to the General Contractor. Accounting of revenues or savings is for the Owner's tracking purposes only.

**END OF SECTION**

## **SECTION 01200 - PROGRESS DOCUMENTATION AND PROCEDURES**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Progress documentation requirements:
    - a. Contractor's construction schedule.
  - 2. Progress procedures:
    - a. Progress meetings.
- B. Contract time is indicated elsewhere.

#### **1.02 SUBMITTALS**

- A. Contractor's Construction Schedule.
  - 1. Submit within 14 days after execution of contract.
  - 2. Submit revised schedule with application for payment to the Division 2 Resident Engineer or Division 7 Roadside Environmental Engineer.

#### **1.03 FORM OF SUBMITTALS**

- A. Schedules - General:
  - 1. Provide legend of symbols and abbreviations for each schedule.
  - 2. Use the same terminology as that used in the contract documents.
  - 3. When transparencies are submitted, use only media which will not fade or lose contrast over time.
- B. Bar Charts:
  - 1. Provide individual horizontal bars representing the duration of each major activity.
  - 2. Coordinate each element on the schedule with other construction activities.
  - 3. Show activities in proper sequence.
  - 4. Show percentage of completion of each activity.
  - 5. Include cost bar at top of chart, showing estimated and actual costs of work performed at the date of each application for payment.
  - 6. Use vertical lines to mark the time scale at not more than one week intervals.
  - 7. Prepare on reproducible transparency.
  - 8. Use sheets of sufficient number and width to show the full schedule clearly.

#### **1.04 COORDINATION**

- A. In preparation of schedules, take into account the time allowed or required for the Engineer's administrative procedures.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION**

#### **3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE**

- A. Prepare and submit a construction schedule.
- B. Provide construction schedule in the form of bar charts:
  - 1. Where related activities must be performed in sequence, show relationship graphically.
  - 2. Indicate activities separately for:
    - a. Each separate building.
  - 3. Incorporate the submittal schedule specified elsewhere.
  - 4. Show dates of:
    - a. Each activity that influences the construction time.
    - b. Ordering dates for products requiring long lead time.

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- c. All submittals required.
  - d. Completion of structure.
  - e. Completion of permanent enclosure.
  - f. Instruction of the owner's personnel in operation and maintenance of equipment and systems.
  - g. Substantial and final completion, with time frames for the Engineer's completion procedures.
5. In developing the schedule take into account:
- a. Work by owner.
  - b. Need for temporary heating, ventilating, or air-conditioning.
- C. The Engineer will notify the contractor if schedule is not satisfactory; revise and resubmit.
1. Resubmit within 7 days.
- D. Make and distribute copies of schedule to the Engineer, to subcontractors, and to other entities whose work will be influenced by schedule dates.
1. Hang a copy of the schedule up in each field office or meeting room.
- E. Update the schedule whenever changes occur or are made, or when new information is received, but not less often than at the same intervals at which applications for payment are made.
1. Indicate changes made since last issue; show actual dates for activities completed.
  2. Submit updated schedule with application for payment.
  3. Issue updated schedule with report of meeting at which revisions are made.
  4. Issue updated schedule in same manner as original schedule.

### **3.02 PROGRESS MEETINGS**

- A. Schedule and conduct periodic progress meetings during construction period.
1. Have meetings once a month.
  2. Notify the Engineer at least one week in advance of date of meeting; the Engineer.
- B. The following are required to attend:
1. Project superintendent.
  2. Major subcontractors and suppliers.
  3. Others who have an interest in the agenda.
  4. State inspectors.
- C. Prepare and distribute agenda prior to meetings; cover the following topics when applicable:
1. Review minutes of previous meeting.
  2. Status of submittals and impending submittals.
  3. Actual progress of activities in relation to the schedule.
  4. Actual and anticipated delays, their impact on the schedule, and corrective actions taken or proposed.
  5. Actual and potential problems.
  6. Status of change order work.
  7. Status of corrective work ordered by the Engineer.
  8. Progress expected to be made during the next period.

## **END OF SECTION 01200**



## **SECTION 01300 - SUBMITTALS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Preparing and processing of submittals for review and action.
  - 2. Preparing and processing of informational submittals.
- B. Submit the following for the Architect/Engineer's review and action:
  - 1. Shop drawings.
  - 2. Product data.
  - 3. Samples.
- C. Submit the following as informational submittals:
  - 1. Reports.
- D. Specific submittals are described in individual sections.
- E. Do not commence work which requires review of any submittals until receipt of returned submittals with an acceptable action.
- F. Submit all submittals to the Engineer.
- G. Related Sections: The following are specified elsewhere in Division 1:
  - 1. Progress of work submittals:
    - a. Contractor's construction schedules.
  - 2. Quality control submittals:
    - a. Test reports.

#### **1.02 DEFINITIONS**

- A. "Shop drawings" are drawings and other data prepared, by the entity who is to do the work, specifically to show a portion of the work.
  - 1. Shop drawings also include:
    - a. Product data specifically prepared for this project.
    - b. Shop or plant inspection and test reports, when made on specific materials, products, or systems to be used in the work.
- B. "Product data submittals" are standard printed data which show or otherwise describe a product or system, or some other portion of the work.
- C. "Samples" are actual examples of the products or work to be installed.
- D. Informational Submittals: Submittals identified in the contract documents as to be submitted for information only.

#### **1.03 FORM OF SUBMITTALS**

- A. Sheets Larger Than 8-1/2 by 14 Inches:
  - 1. Maximum sheet size: 36 by 48 inches.
    - a. Exception: Full size pattern or template drawings.
  - 2. Number of copies:
    - a. Submittals for review:
      - 1. One correctable reproducible print, not folded and 6 copies] of blue- or black-line print(s).
      - 2. Reproducible will be returned.
- B. Small Sheets or Pages:
  - 1. Minimum sheet size: 8-1/2 by 11 inches.
  - 2. Maximum sheet size for opaque copies: 8-1/2 by 17 inches.
  - 3. Number of copies:
    - a. One (1) Electronic Submittal Copy: General Contractor to Email one (1) stamped and signed copy to the Architect, Resident Engineer, and Roadside Engineer.

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- b. Electronic Submittal shall be in PDF. format.
- c. Architect and Engineer shall review, stamp and sign submittal; scan and return 1 set to the General Contractor, Resident Engineer, and Roadside Engineer for distribution to his subcontractors, suppliers, and retain 1 copy for his field office.
- C. If additional sets are needed by other entities involved in work represented by the samples, submit with original submittal.
- D. Copies in excess of the number requested will not be returned.

#### **1.04 COORDINATION OF SUBMITTALS**

- A. Coordinate submittals and activities that must be performed in sequence, so that the Engineer has enough information to properly review the submittals.
- B. Coordinate submittals of different types for the same product or system so that the Engineer has enough information to properly review each submittal.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.01 TIMING OF SUBMITTALS**

- A. Transmit each submittal at or before the time indicated on the approved schedule of submittals.
  - 1. Prepare and submit for approval a schedule showing the required dates of submittal of all submittals.
  - 2. Organize the schedule by the applicable specification section number.
  - 3. Incorporate the contractor's construction schedule specified elsewhere.
  - 4. Submit within 14 days after commencement of the work.
  - 5. Revise and resubmit the schedule for approval when requested.
- B. Deliver each submittal requiring approval in time to allow for adequate review and processing time, including resubmittals if necessary; failure of the contractor in this respect will not be considered as grounds for an extension of the contract time.
- C. Deliver each informational submittal prior to start of the work involved, unless the submittal is of a type which cannot be prepared until after completion of the work; submit promptly.
- D. If a submittal must be processed within a certain time in order to maintain the progress of the work, state so clearly on the submittal.

### **3.02 SUBMITTAL PROCEDURES - GENERAL**

- A. Contractor Review: Sign each copy of each submittal certifying compliance with the requirements of the contract documents.
- B. Notify the Engineer, in writing and at time of submittal, of all points upon which the submittal does not conform to the requirements of the contract documents, if any.
- C. Preparation of Submittals:
  - 1. Label each copy of each submittal, with the following information:
    - a. Project name.
    - b. Date of submittal.
    - c. Contractor's name and address.
    - d. Engineer's name and address.
    - e. Subcontractor's name and address.
    - f. Other necessary identifying information.
  - 2. Pack submittals suitably for shipment.
  - 3. Submittals to receive Engineer's action marking:  
Provide blank space on the label or on the submittal itself for action marking; minimum 4 inches wide by 5 inches high.

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- D. Transmittal of Submittals:
1. Submittals will be accepted from the contractor only. Submittals received from other entities will be returned without review or action.
  2. Submittals received without a transmittal form will be returned without review or action.
  3. Transmittal form: Similar to AIA G810.
  4. Fill out a separate transmittal form for each submittal; also include the following:
    - a. Other relevant information.
    - b. Requests for additional information.

### **3.03 SHOP DRAWINGS**

- A. Content: Include the following information:
1. Dimensions, at accurate scale.
  2. All field measurements that have been taken, at accurate scale.
  3. Names of specific products and materials used.
  4. Coordination requirements; show relationship to adjacent or critical work.
  5. Name of preparing firm.
- B. Preparation:
1. Identify as indicated for all submittals.
  2. Space for Engineer's action marking shall be adjacent to the title block.

### **3.04 PRODUCT DATA**

- A. When product data submittals are prepared specifically for this project (in the absence of standard printed information) submit such information as shop drawings and not as product data submittals.
- B. Content:
1. Submit manufacturer's standard printed data sheets.
  2. Show compliance with properties specified.
  3. Show compliance with the specific standards referenced.
  4. Show compliance with specified testing agency listings; show the limitations of their labels or seals, if any.
  5. Identify dimensions which have been verified by field measurement.
  6. Show special coordination requirements for the product.

### **3.05 SAMPLES**

- A. Samples:
1. Provide samples that are the same as proposed product.
  2. Where unavoidable variations must be expected, submit "range" samples, minimum of 3 units, and describe or identify variations among units of each set.
- B. Preparation:
1. Attach a description to each sample.
  2. Attach name of manufacturer or source to each sample.
- C. Keep final sample set(s) at the project site, available for use during progress of the work.

### **3.06 REVIEW OF SUBMITTALS**

- A. Submittals for approval will be reviewed, marked with appropriate action, and returned.
- B. Informational submittals: Submittals will be reviewed.
1. "X" action: No action taken.
  2. "Not Approved" action: Revise the submittal or prepare a new submittal complying with the comments made.
  3. A copy will be returned if submittal is unsatisfactory.

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**3.07 RETURN, RESUBMITTAL, AND DISTRIBUTION**

- A. Submittals will be returned to the contractor by mail.
- B. Perform resubmittals in the same manner as original submittals; indicate all changes other than those requested by the Engineer.
- C. Distribution:
  - 1. Make extra copies for operation and maintenance data submittals, as required.

**END OF SECTION 01300**

## **SECTION 02072 - DEMOLITION FOR REMODELING**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

A. Section Includes:

1. Demolition and removal of portions of the existing Rest Area building or structure; including floor framing, exterior and interior siding/sheathing/drywall/tile walls, windows, doors and frames, drywall ceilings, wall & roof fiberglass insulation, roofing, toilet partition/accessories, display cases, solar panels & systems, plumbing, mechanical heating and cooling equipment, electrical systems.
  - a. Site Clearing including sidewalks, shrub and root removal are by the Contractor; (see Landscape Spec's).
  - b. See Section 01151 for the Construction and Demolition Materials Recycling Requirements.
2. Owner shall have the right to salvage the Contractor removed automatic sliding doors, display cases, toilet fixtures, and toilet partitions.
  - a. Removal of existing small shrubbery (may be by NCDOT, Division office).

#### **1.02 SUBMITTALS**

A. Project Record Documents:

1. Identify location of capped utilities.
2. Submit form Sections 01151A and 01151B per Section 01151 for the Construction and Demolition Materials Recycling Requirements.

#### **1.03 PROJECT CONDITIONS**

A. Existing Conditions:

1. After the project is begun, the contractor is responsible for the condition of structures. The owner does not warrant that the condition of structures will not have changed since the time of inspection for bidding purposes.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that utilities have been disconnected and sealed.
- B. Survey existing conditions and correlate with drawings and specifications to determine extent of demolition required; see Mechanical and Electrical drawings. Salvage costs shall be reflected in the Contractor's bid.
- C. Insofar as is practicable, arrange operations to reveal unknown or concealed structural conditions for examination and verification before removal or demolition.

#### **3.02 PREPARATION**

A. Protection:

1. Provide for the protection of persons passing around or through the area of demolition.

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2. Perform demolition so as to prevent damage to adjacent improvements and facilities to remain.
- B. Construct and maintain shoring, bracing, and supports as necessary to ensure the stability of structures.

### **3.03 UTILITY SERVICES**

- A. Arrange with utility companies and shut off indicated utilities serving structures.
- B. Disconnect and cap indicated utilities before starting demolition operations.
- C. Identify location of capped utilities on project record documents.

### **3.04 POLLUTION CONTROLS**

- A. Observe environmental protection regulations.
- B. Do not allow water usage that results in freezing or flooding.

### **3.05 DEMOLITION - GENERAL**

- A. Remove: Unless items are otherwise indicated to be reinstalled or salvaged, remove and scrap.
- B. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare for service; reinstall in the same location (or in the location indicated).
- C. Remove and Install New: Remove and dispose of items indicated and install new items in the same location (or in the location indicated).
- D. Remove and Salvage: Items indicated to be salvaged will remain the Owner's property. Carefully remove and clean items indicated to be salvaged; protect against damage; Owner may salvage some of the toilet fixtures, and toilet partitions.
- E. Remove and Scrap: Remove and dispose of items indicated in Section 01151 for the Construction and Demolition Materials Recycling Requirements.
  1. Items of value to the contractor: Do not store removed items on site.
- F. Existing to Remain: Construction or items indicated to remain shall be protected against damage during demolition operations. Where practicable, and with the architect's permission, the contractor may elect to remove items to a suitable storage location during demolition and then properly clean and reinstall the items.
- G. Perform work in a systematic manner.
- H. Perform selective demolition using methods which are least likely to damage work to remain and which will provide proper surfaces for patching.

### **3.06 DEMOLITION ON OR BELOW GRADE**

- A. Where portions of concrete slabs-on-grade are to be removed, first outline the portion with a concrete saw to a depth of at least 1 inch.

### **3.07 FILLING BELOW-GRADE AREAS AND VOIDS**

- A. Below-grade areas and voids resulting from demolition of structures shall be filled or excavated further, as appropriate, according to requirements specified elsewhere in Division 2.

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**3.08 DISPOSAL OF DEMOLISHED MATERIALS**

- A. Promptly dispose of materials resulting from demolition operations. Do not allow materials to accumulate on site. See Section 01151 for the Construction and Demolition Materials Recycling Requirements.
- B. Transport concrete or masonry debris resulting from demolition operations and dispose off the Owner's property.
- C. Transport all other materials resulting from demolition operations and legally dispose of off-site.
- D. Do not burn removed materials on project site.
- F. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

**3.09 CLEANING**

- A. Clean soil, smudges, and dust from surfaces to remain.

**END OF SECTION 02072**

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## **SECTION 05720 –ALUMINUM HANDRAILS AND RAILINGS**

### **PART 1 – GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Aluminum handrails and railing.

#### **1.2 REFERENCES**

- A. AAMA 2604–Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- B. ASTM B 221 –Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Wire, Profiles, and Tubes; 1996.
- C. ASTM E 935 -Standard Test Methods for Permanent Metal Railing Systems and Rails for Buildings.
- D. ASTM E 985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.
- E. ASTM A555 – Standard Specification for General Requirements for Stainless Steel Wire and Wire Rods.
- F. ANSI – Z97.1 Safety Performance Specifications and Methods of Testing for Safety Glazing Materials Used in Buildings.
- G. ADA -American with Disabilities Act Accessibility Guidelines.
- H. SBCCI Standard Building Code; Southern Building Code Congress International, Inc.; 1997.
- I. ICC International Building Codes; International Code Counsel; 2003.

#### **1.3 SUBMITTALS**

- A. Submit under provisions of Section 01300.
- B. Product Data : Manufacturer’s data sheets on each product to be used, including;
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings: Drawings showing fabrication and installation of handrails including plans, elevations, sections, details of components, anchor details, and attachment to adjoining units of work.
- D. Samples for Initial Railing Style and Color Selection.

#### **1.4 QUALITY ASSURANCE**

- A. Railings Structural Requirements:
  - 1. Handrail Assemblies and Guards shall be able to resist a single concentrated load of 200 pounds applied in any direction at any point along the top.
  - 2. Infill area of guardrail system capable of withstanding a horizontal concentrated load of 200 pounds applied to one square foot at any point in the system.
  - 3. Handrail Assemblies and Guards shall be designed to resist a load of 50 plf applied in any direction at the top, and to transfer this load through the supports to the structure.
- B. Single Source Responsibility: Obtain handrails and railing systems from a single source fabricator/manufacturer.

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### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Materials to be delivered to the job site in good condition and adequately protected against damage as handrails are a finished product.
- B. Store in a location and manner to avoid damage. Store handrails and components in a dry, ventilated area. Do not store around uncured concrete or harsh chemicals.

### **1.6 PROJECT CONDITIONS**

- A. Maintain environmental conditions within limits recommended by manufacturer for optimum results.
- B. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
- C. Coordinate railing fabrication schedule with construction progress to avoid delays.

## **PART 2 – PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. Architectural Railings & Grilles; Web:<http://www.aluminum-rails.com>
  - 2. FSI Home Products Division; Web: <http://www.railingworks.com>
  - 3. Feeney Architectural; web: <http://www.feeneyinc.com>
  - 4. Approved equal

### **2.2 ALUMINUM RAILINGS**

- A. Pre-manufactured Railing Systems: RailingWorks Architectural Railing Systems.
- B. Railing Styles:
  - 1. 2-line Picket Railings
- C. Post and Mounting:
  - 1. Stanchion Mount
- D. Materials:
  - 1. Posts: 2 inch square hollow extrusion
  - 2. Pickets: 1 inch square hollow extrusion
  - 3. Top Handrail: 2 1/2 inch wide, 1 5/8 inch tall two piece hollow extrusion
  - 4. Bottom Rail: 1 13/16 inch wide, 1 1/2 inch tall two piece hollow extrusion
- E. Fasteners:
  - 1. 18-8 & 410-grade Stainless Steel and/or Aluminum Fasteners.
- F. Connections: Railing manufacturer's standard mechanical fasteners and fittings, providing flush, smooth, rigid joints that can be removed and reconnected after installation.
- G. Exposed Ends of Hollow Members: Closed with manufacturers prefabricated end fittings.
- H. Anchors and Inserts: Stainless steel, capable of withstanding structural design loads specified.
  - 1. Expansion anchors.

### **2.3 ALUMINUM HAND RAILS**

- A. General: Fabricate handrails to comply with requirements indicated for design, dimensions, details, finish and member sizes including wall thickness of hollow members, but not less than those required to support structural loads.

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**2.4 FINISH**

- A. Electrostatically applied polyester powder coating fused to aluminum, complying with AAMA 2604 standards. Color to be selected by Architect from railing manufacturers range.

**2.5 ACCESSORIES**

- A. Grout and Anchoring Cement: Non-shrink, non-metallic, non-corrosive, waterproof cement-based structural grout complying with ASTM C 1107.

**2.6 FABRICATION**

- A. Fabricate handrails and railing systems to comply with manufacturer's printed requirements, project design requirements, details, dimensions, and finish but not less than the structural requirements to support required loads. Disassemble handrails and railing only as necessary for shipping and handling.
- B. Clearly mark all components for onsite reassembly and installation.
- C. Use connections that maintain structural capacity of joined members.

**PART 3 –EXECUTION****3.1 EXAMINATION**

- A. Examine system components, substrate, and conditions where railing systems are to be installed.
- B. Notify Architect of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected.
- C. Verify that reinforcement and anchoring devices are the correct type, have been located correctly, and have been installed properly.

**3.2 PREPARATION**

- A. Coordinate drawings, diagrams, templates, instructions, and directions for installation of anchors, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors, which are to be embedded in concrete as masonry construction.
  - 1. Manufacturer shall supply all integral hardware for connection of handrail and railing to each other.
  - 2. Provide hardware needed to connect handrail or railing to adjoining structures.
- 3. Coordinate delivery of such items to Project site.

**3.3 INSTALLATION GENERAL**

- A. Install in accordance with manufacturers instructions and detailed drawings.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing handrails and railings. Set handrails and railings accurately in location, alignment, and elevation, measured from established lines and levels.
  - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means.

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2. Align handrails and railing so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Fit exposed connections together to form tight, hairline joints.
- D. Corrosion Protection: Coat concealed surfaces of aluminum alloys that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary to secure in-place construction. Separate dissimilar materials with bushings, grommets, or washers to prevent electrolytic corrosion.

### **3.4 CLEANING**

- A. Tap water containing mild soaps, detergents, or automotive cleaners should be used on painted aluminum surfaces.

### **3.5 PROTECTION**

- A. Protect installed products from damage by subsequent construction activities, until completion of Project.
- B. Field repair of damaged product finishes with Manufactures painted color touch up only. Return items that cannot be repaired to the manufacturer for repair or replacements.

**END OF SECTION 05720**

## **SECTION 06100 - ROUGH CARPENTRY**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Rough carpentry for:
    - a. Wood framing and sheathing for the renovation of the existing rest area.
    - b. Miscellaneous lumber for attachment and support of other work.
  - 2. Preservative treatment.

#### **1.02 SUBMITTALS**

- A. Product Data:
- B. Framing Connectors and Supports: Submit manufacturer's standard data demonstrating compliance with building code requirements.
- C. Treated Wood: Treating plant's instructions for use, including storage, cutting, and finishing.
  - 1. Pressure preservative treatment: Treating plant's certification of compliance with specified standards and stating process employed and preservative retention values.
    - a. Treatment for above-ground use: Certification of kiln drying after treatment.

#### **1.03 QUALITY ASSURANCE**

- A. Inspection Agencies:
  - 1. SPIB: Southern Pine Inspection Bureau; for all structural framing of roof joists and headers.

### **PART 2 – PRODUCTS**

#### **2.01 DIMENSION LUMBER**

- A. Size: Provide nominal sizes indicated, complying with NIST PS 20 except where actual sizes are specifically required. Provide continuous members; splicing is not acceptable.
  - 1. Surfacing: Dressed lumber (S4S).
  - 2. Moisture content: Kiln-dry or MC15 (15 percent maximum moisture content).
- B. Stud Framing -- 2 x 4 through 2 x 8: Grade: Stud Grade or better.
- C. Joist and Small Beam Framing -- 2 x 6 through 4 x 16:
  - 1. Species: Spruce-Pine-Fir (SPF), Grade: No. 2.
- D. Miscellaneous Lumber: Provide dimension lumber and boards necessary for the support of work specified in other sections, whether or not specifically indicated, and including but not limited to blocking, nailers, etc.
  - 1. Lumber: S4S, No. 2 or better, 15 percent maximum (kiln-dry).

#### **2.02 CONSTRUCTION PANELS**

- 2. A. Roof Sheathing: Oriented Strand Board sheathing: APA Rated, OSB Structural Panels, Exposure 1 (exterior glue), PS-2 or APA PRP-108 performance standards, 24/16 spacing, and 5/8" thick.
- B. Wall Sheathing: Oriented Strand Board (OSB), square edged, APA Rated (exterior glue) sheathing panels with nailing pattern recommended by the manufacturer for shear walls, and nominal 1/2" thick.

#### **2.03 MISCELLANEOUS MATERIALS**

- A. Fasteners: Provide as required by applicable codes and as otherwise indicated.
  - 1. Provide fasteners with a hot-dip zinc coating (ASTM A 153) for treated lumber and where wood is in ground contact, subjected to high relative humidity, or exposed to weather.
- B. Framing Connectors and Supports: Prefabricated, formed steel units; hot-dip galvanized finish unless otherwise indicated; type and size as required; approved by applicable codes.

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1. The following manufacturer's products, or approved equal, provided they comply the the requirements of the contract documents, will be among those considered acceptable:
  - a. Cleveland Steel Specialty Company.
  - b. Simpson Strong-Tie Company.
  - c. United Steel Products (USP) Company.
- C. Saturated Building Felt (30#)
- D. Sill Sealer Gaskets: Glass fiber insulation strips; uncompressed thickness, 1 inch (1/32 inch compressed); width to match sill members.

## **2.04 WOOD TREATMENT BY PRESSURE PROCESS**

- A. Aboveground Lumber: AWPB LP-2 (waterborne preservatives).
  1. Kiln dried after treatment to 19 percent maximum moisture content.
  2. Treat the following:
    - a. Wood in contact with masonry or concrete.
    - b. Sill plate.
    - c. Other members indicated.
- B. Fasteners for Preservative Treated Wood: Hot-dip galvanized steel (ASTM A153).

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION - GENERAL**

- A. Arrange work to use full length pieces except where lengths would exceed commercially available lengths. Discard pieces with defects that would lower the required strength or appearance of the work.
- B. Cut and fit members accurately. Install plumb and true to line and level.
- C. Fasten carpentry in accordance with applicable codes and recognized standards.
- D. Where exposed, countersink nails and fill flush with suitable wood filler.

### **3.02 MISCELLANEOUS CARPENTRY**

- A. Provide miscellaneous blocking, nailers, grounds, and framing as shown and as required for support of facing materials, fixtures, specialty items, and trim. Cut and shape to the required size. Provide in locations required by other work.
- B. Use countersunk fasteners appropriate to applied loading.

### **3.03 WOOD FRAMING - GENERAL**

- A. Comply with sizes, spacing, and configurations indicated. Where not specifically indicated, comply with applicable codes and NFPA "Manual for Wood Frame Construction." Splice members only where specifically indicated or approved.
- B. Space fasteners as indicated. Where not specifically indicated, comply with applicable codes and the "Recommended Nailing Schedule" of NFPA "Manual for Wood Frame Construction" and "National Design Specification for Wood Construction."

### **3.04 INSTALLATION OF CONSTRUCTION PANELS**

- A. Employ the following fastening methods:
  1. Nail roof and wall sheathing to framing.
    - a. Provide solid blocking under panel edges other than intact tongue and groove edges.

### **3.05 AIR INFILTRATION BARRIER**

- A. Install air infiltration barrier in accordance with manufacturer's instructions.

## **END OF SECTION 06100**

## **SECTION 06200 - FINISH CARPENTRY**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Window and door trim
- B. Fiber-cement lap siding, siding panels, and trim see Section 07462.

#### **1.02 SUBMITTALS**

- A. Plastic Laminate:
  - 1. Product data.
  - 2. Samples for verification: 8- by 10-inch piece of each type, pattern, and color.
- B. Coordinate installation of woodwork with other work to avoid damage.

### **PART 2 - PRODUCTS**

#### **2.01 WOODWORK**

- A. All Woodwork Finishes: As indicated on drawings.

#### **2.02 WOOD MATERIALS**

- A. Lumber: Species and grade as indicated; lumber ready for installation shall comply with WM 4, "General Requirements For Wood Molding," Wood Molding and Millwork Producers (WMMP).
  - 1. Specie(s):
    - a. "Pine": Plain sawn Spruce or Idaho white pine at window extensions and window trim
  - 2. Softwood: Comply with NIST PS 20 and grade in accordance with the grading rules of the grading and inspection agency applicable to the species.
  - 3. For transparent finish, use only solid pieces of lumber; WM 4 N-grade.
  - 4. For opaque finish, pieces which are glued up may be used; WM 4 N- or P-grade.
  - 5. Moisture content: Not greater than that required by applicable grading rules; provide kiln-dried lumber.
  - 6. Provide lumber dressed on all exposed faces, unless otherwise indicated.
  - 7. Do not use twisted, warped, bowed, or otherwise defective lumber.
  - 8. Sizes indicated are nominal, unless otherwise indicated.
  - 9. Do not mark or color lumber, except where such marking will be concealed in finish work.
- B. Plywood: Types, grades, and cores as indicated.
  - 1. Medium density overlaid plywood: NBS PS 1, Special Exterior MDO.
  - 1. Plywood in concealed locations: Comply with NBS PS 1, Grade C minimum.

#### **2.03 MELAMINE SHELVING:**

- A. Shelving: 3/4" thick premium MDF, Medium Density Fiber boards

#### **2.04 FABRICATION**

- A. Fabricate in sizes and shapes indicated and using details indicated.
- B. Complete fabrication and assembly in shop.
  - 1. Ease edges of solid lumber members where indicated, using:
    - a. 1/16-inch radius for members 1 inch or less nominal thickness.

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- b. 1/8-inch radius for members more than 1 inch nominal thickness.
- C. Where woodwork is indicated to be field finished, sand smooth, fill nail holes, clean thoroughly, and otherwise prepare for finishing.
- D. Standing and Running Trim: Miter exposed ends of members to match profile.
  - 1. Rout out backs of flat members over 2 inches wide, unless ends are exposed.
  - 2. Kerf backs of flat members over 4 inches wide, except where ends are exposed.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Verify that blocking and backings have been installed at appropriate locations for anchorage.

### **3.02 INSTALLATION – GENERAL**

- A. Do not begin installation of interior woodwork until potentially damaging construction operations are complete in the installation area.
- B. Make joints neatly, with uniform appearance.
- C. Install woodwork in correct location, plumb and level, without rack or warp.
  - 1. Where adjoining surfaces are flush, install with maximum 1/16-inch offset.
  - 2. Where adjoining surfaces are separated by a reveal, install with maximum 1/8-inch offset.
- D. Cut woodwork precisely to fit.
- E. Secure woodwork to blocking or use anchors indicated.
  - 1. Where anchorage method is not indicated, conceal all fasteners where possible.
  - 2. Where exposed nailing is required or indicated, use finishing nails, countersink, and fill.
- F. Repair damaged and defective woodwork to eliminate visual and functional defects; where repair is not possible, replace woodwork.
- G. Standing and Running Trim: Use longest pieces available and as few joints as possible.
  - 1. Stagger joints in built-up trim members. Miter all vertical joints tight at 45 degrees at interior T&G Cedar wall siding and fascia corners. Miter external and miter internal corners.
  - 2. Use diagonal (scarfed) joints in lengths of trim.
  - 3. Cope or miter at inside corners and miter at outside corners; fit tightly.
  - 4. Allowed variation in plumb and level: Not more than 1/8 inch in 8 feet.
  - 5. Install by blind-nailing where possible. Use face-nailing with fine finishing nails countersunk and filled at starter course only.
- H. Panel Type Paneling:
  - 1. Arrange panels for best appearance.
  - 2. Install with tight joints, unless otherwise indicated.
    - 1. Install by face-nailing with fine finishing nails countersunk and filled.

### **3.03 PROTECTION**

- A. Protect woodwork from damage and maintain design environmental conditions.

## **END OF SECTION 06200**



## **SECTION 06250 - CEDAR**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Wood trim for display case and lobby interior
- B. Existing interior.
- C. Exterior trim at porch lights

#### **1.02 SUBMITTALS**

- A. Western Red Cedar:
  - 1. Product data.
  - 2. Samples for verification: 8- by 10-inch piece of each type, pattern, and color.
- B. Coordinate installation of woodwork with other work to avoid damage.

### **PART 2 - PRODUCTS**

#### **2.01 WOODWORK**

- A. All Woodwork Finishes: As indicated on drawings.

#### **2.02 WOOD MATERIALS**

- A. Lumber: Species and grade as indicated; lumber ready for installation shall comply with WM 4, "General Requirements For Wood Molding," Wood Molding and Millwork Producers (WMMP).
  - 1. Specie(s):
    - a. Plain sawn Western Red Cedar at display cases and lobby interior trim, grade A clear.
    - b. Western Red Cedar for tongue and groove boards for lobby walls , grade A clear
    - c. Plain sawn Western Red Cedar for exterior trim
  - 2. Moisture content: Not greater than that required by applicable grading rules; provide kiln-dried lumber.
  - 3. Provide lumber dressed on all exposed faces, unless otherwise indicated.
  - 4. Do not use twisted, warped, bowed, or otherwise defective lumber.
  - 5. Sizes indicated are nominal, unless otherwise indicated.
  - 6. Do not mark or color lumber, except where such marking will be concealed in finish work.

#### **2.03 FABRICATION**

- A. Fabricate in sizes and shapes indicated and using details indicated.
- B. Complete fabrication and assembly in shop.
  - 1. Ease edges of solid lumber members where indicated, using:
    - a. 1/16-inch radius for members 1 inch or less nominal thickness.
    - b. 1/8-inch radius for members more than 1 inch nominal thickness.
- C. Where woodwork is indicated to be field finished, sand smooth, fill nail holes, clean thoroughly, and otherwise prepare for finishing.
- D. Standing and Running Trim: Miter exposed ends of members to match profile.
  - 1. Rout out backs of flat members over 2 inches wide, unless ends are exposed.
  - 2. Kerf backs of flat members over 4 inches wide, except where ends are exposed.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Verify that blocking and backings have been installed at appropriate locations for anchorage.

### **3.02 INSTALLATION – GENERAL**

- A. Do not begin installation of interior woodwork until potentially damaging construction operations are complete in the installation area.
- B. Make joints neatly, with uniform appearance.
- C. Install woodwork in correct location, plumb and level, without rack or warp.
  - 1. Where adjoining surfaces are flush, install with maximum 1/16-inch offset.
  - 2. Where adjoining surfaces are separated by a reveal, install with maximum 1/8-inch offset.
- D. Cut woodwork precisely to fit.
- E. Secure woodwork to blocking or use anchors indicated.
  - 1. Where anchorage method is not indicated, conceal all fasteners where possible.
  - 2. Where exposed nailing is required or indicated, use finishing nails, countersink, and fill.
- F. Repair damaged and defective woodwork to eliminate visual and functional defects; where repair is not possible, replace woodwork.
- G. Standing and Running Trim: Use longest pieces available and as few joints as possible.
  - 1. Stagger joints in built-up trim members. Miter all vertical joints tight at 45 degrees at interior T&G Cedar wall siding and fascia corners. Miter external and miter internal corners.
  - 2. Use diagonal (scarfed) joints in lengths of trim.
  - 3. Cope or miter at inside corners and miter at outside corners; fit tightly.
  - 4. Allowed variation in plumb and level: Not more than 1/8 inch in 8 feet.
  - 5. Install by blind-nailing where possible. Use face-nailing with fine finishing nails countersunk and filled at starter course only.

### **3.03 FINISHING**

- A. Exterior cedar: Semi-solid stain and sealer, apply according to manufacturer instructions, color to be selected by architect
- B. Interior cedar: Clear Lacquer, apply according to manufacturer instructions

### **3.04 PROTECTION**

- A. Protect woodwork from damage and maintain design environmental conditions.

## **END OF SECTION 06200**

## **SECTION 06651 - SOLID SURFACE FABRICATIONS**

### **PART 1 — GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. This Section includes the following horizontal and trim solid surface product types:
1. Changing tables
  2. Benches
  3. Windowsills
  4. Cove backsplashes
- B. Related Sections include the following:
1. Division 6 Section "Rough Carpentry" for Blocking.

#### **1.3 DEFINITION**

- A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

#### **1.4 SUBMITTALS**

- A. Product data:
1. For each type of product indicated.
  2. Product data for the following:
    - a. Chemical-resistant tops: chlorine bleach
- B. Shop drawings:
1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
    - a. Show full-size details, edge details, thermoforming requirements, attachments, etc.
    - b. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
- C. Samples:
1. For each type of product indicated.
    - a. Submit minimum 6-inch by 6-inch sample in specified gloss.
    - b. Cut sample and seam together for representation of inconspicuous seam.
    - c. Indicate full range of color and pattern variation.
  2. Approved samples will be retained as a standard for work.
- D. Product data:
1. Indicate product description, fabrication information and compliance with specified performance requirements.
- E. Maintenance data:
1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
    - a. Maintenance kit for finishes shall be submitted.
  2. Include in project closeout documents.

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## 1.5 QUALITY ASSURANCE

### A. Qualifications:

1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

### B. Fabricator/installer qualifications:

1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

### C. Applicable standards:

1. Standards of the following, as referenced herein:
  - a. American National Standards Institute (ANSI)
  - b. American Society for Testing and Materials (ASTM)
  - c. National Electrical Manufacturers Association (NEMA)
  - d. NSF International
2. Fire test response characteristics:
  - a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
    - 1) Flame Spread Index: 25 or less.
    - 2) Smoke Developed Index: 450 or less.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation.
- B. Store components indoors prior to installation.
- C. Handle materials to prevent damage to finished surfaces.
  1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

## 1.7 WARRANTY

- A. Provide manufacturer's warranty against defects in materials.
  1. Warranty shall provide material and labor to repair or replace defective materials.
  2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.
- B. Manufacturer's warranty period:
  1. Ten years from date of substantial completion.

## 1.8 MAINTENANCE

- A. Provide maintenance requirements as specified by the manufacturer.

## PART 2 — PRODUCTS

### 2.1 MATERIALS

- A. Solid polymer components
  1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.

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2. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.

- B. Thickness: 1/2 inch
- C. Edge treatment: Bullnose
- D. Backsplash: Coved.
- E. Sidesplash: Applied.

## 2.2. PERFORMANCE CHARACTERISTICS:

Property	Typical Result	Test
Tensile Strength	6,000 psi	ASTM D 638
Tensile Modulus	$1.5 \times 10^{-6}$ psi	ASTM D 638
Tensile Elongation	0.4% min.	ASTM D 638
Flexural Strength	10,000 psi	ASTM D 790
Flexural Modulus	$1.2 \times 10^{-6}$ psi	ASTM D 790
Hardness	>85	Rockwell "M" Scale
	56	ASTM D 785 Barcol Impressor
Thermal Expansion	$3.02 \times 10^{-5}$ in./in./°C ( $1.80 \times 10^{-5}$ in./in./°F)	ASTM D 2583 ASTM D 696
Gloss (60° Gardner)	5–75 (matte—highly polished)	ANSI Z124
Light Resistance	(Xenon Arc) No effect	NEMA LD 3-2000 Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 & Z124.6
Stain Resistance: Sheets	Passes	ANSI Z124.3 & Z124.6
Fungus and Bacteria Resistance	Does not support microbial growth	ASTM G21&G22
Boiling Water Resistance	No visible change	NEMA LD 3-2000 Method 3.5
High Temperature Resistance	No change	NEMA LD 3-2000 Method 3.6
Izod Impact (Notched Specimen)	0.28 ft.-lbs./in. of notch	ASTM D 256 (Method A)
Ball Impact Resistance: Sheets	No fracture—1/2 lb. ball: 1/4" slab—36" drop 1/2" slab—144" drop	NEMA LD 3-2000 Method 3.8
Weatherability	$\Delta E^*_{94} < 5$ in 1,000 hrs.	ASTM G 155
Specific Gravity †	1.7	
Water Absorption	Long-term 0.4% (3/4") 0.6% (1/2") 0.8% (1/4")	ASTM D 570
Toxicity	99 (solid colors) 66 (patterned colors)	Pittsburgh Protocol Test ("LC50" Test)
Flammability	All colors (Class I and Class A)	ASTM E 84, NFPA 255 & UL 723
Flame Spread Index	<25	
Smoke Developed Index	<25	

† Approximate weight per square foot: 1/4" (6 mm) 2.2 lbs., 1/2" (12.3 mm) 4.4 lbs.

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Shapes meet or exceed the ANSI Z124.3 and ANSI Z124.6 standards for plastic sinks and lavatories.  
NEMA results based on the NEMA LD 3-2000

## 2.3 ACCESSORIES

### A. Joint adhesive:

1. Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.

### B. Sealant:

1. Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone — any type), UL-listed silicone sealant in colors matching components.

## 2.4 FACTORY FABRICATION

### A. Shop assembly

1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
2. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
  - a. Reinforce with strip of solid polymer material, 2" wide.
3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
4. Rout and finish component edges with clean, sharp returns.
  - a. Rout cutouts, radii and contours to template.
  - b. Smooth edges.
  - c. Repair or reject defective and inaccurate work.

## 2.5 FINISHES

### A. Select from the manufacturer's standard color chart.

1. Color: Buried Beach by Corian, basis of design

### B. Other acceptable manufacturers (color to be selected by architect)

1. Wilsonart-Gibraltar
2. Avonite

## PART 3 — EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with fabricator 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.

### 3.2 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
  1. Provide product in the largest pieces available.
  2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
    - a. Exposed joints/seams shall not be allowed.

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3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
  4. Cut and finish component edges with clean, sharp returns.
  5. Rout radii and contours to template.
  6. Anchor securely to base cabinets or other supports.
  7. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.
  8. Carefully dress joints smooth, remove surface scratches and clean entire surface.
  9. Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.
- B. Coved backsplashes and applied sidesplashes:
1. Install applied sidesplashes using manufacturer's standard color-matched silicone sealant.
  2. Adhere applied sidesplashes to countertops using manufacturer's standard color-matched silicone sealant.

### **3.3 REPAIR**

- A. Repair or replace damaged work which cannot be repaired to architect's satisfaction.

### **3.4 CLEANING AND PROTECTION**

- A. Keep components clean during installation.  
B. Remove adhesives, sealants and other stains.

**END OF SECTION**

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## **SECTION 06730 - COMPOSITE DECKING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Composite Decking

#### **1.2 RELATED SECTIONS**

- A. Section 06-1100 – Wood Framing

#### **1.3 REFERENCES**

- A. ASTM D-7032-04: Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails), ASTM International.
- B. ASTM D-7031-04: Standard Guide for Evaluating Mechanical and Physical Properties of Wood-Plastic Composite Products, ASTM International
- C. ASTM E-84-01: Test Method for Surface Burning Characteristics of Building Materials, ASTM International.
- D. ASTM D 570: Water Absorption of Plastics
- E. ASTM D 1761: Mechanical Fasteners in Wood
- F. ASTM D -1413-99: Test method for Wood Preservatives by Laboratory Soil-block Cultures
- G. ASTM C177: Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

#### **1.4 DESIGN/PERFORMANCE REQUIREMENTS**

- A. Structural Performance:
  - a. Deck: Uniform Load – 100lbf/sq.ft.
  - b. Tread of Stairs: Concentrated Load: 750 lbf/sq.ft., and 1/8" max. deflection with a concentrated load of 300 lbf on area of 4 sq. in.
- B. Fire-Test Response Characteristics per ASTM E-84.

#### **1.5 SUBMITTALS**

- A. Product Data Indicate sizes, profiles, surface style, and performance characteristics
- B. Samples: For each product specified, one sample representing actual product color, size, and finish.

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Store products on a flat and level surface. Adjust support blocks accordingly
- B. Support bundles on supplied dunnage
- C. When stacking bundles, supports should start approximately 8" from each end and be spaced approximately 2ft on center. Supports should line up vertically/perpendicular to the decking product.
- D. Do not stack decking more than 14 bundles.
- E. Keep material covered using the provided bundle cover until time of installation.
- F. Refer to manufacturers instruction for further detailed information.

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## 1.7 WARRANTY

- A. Provide manufactures warranty against rot, decay, splitting, checking, splintering, fungal damage, and termite damage for a period of 10 years for a commercial installation.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Trex.  
B. Moisture Shield  
C. Azek

### 2.2 APPLICATIONS/SCOPE

- A. Wood-Plastic Composite Lumber;
- a. Material Description: Composite Decking consisting of recycled Linear Low Density Polyethylene (LLDPE) and recycled wood. The product is extruded into shapes and sizes as follows:
    - i. Section; 1 x 5.5".
    - ii. Lengths – 12, 16, and 20 feet
    - iii. Color – To be specified by architect.
  - b. Physical and Mechanical Properties as follows:

Test	Test Method	Value	
Flame spread	ASTM E 84	60(Transcend) / 85(Enhance)	
Thermal Expansion	ASTM D 1037	1.9 x 10-5 inch/inch/degreeF	
Moisture Absorption	ASTM D 1037	< 1%	
Screw Withdrawal	ASTM D1761	558 lbs/in	
Fungus Resistance	ASTM D1413	Rating - no decay	
Termite Resistance	AWPAE1-72	Rating = 9.6	
		<b>Ultimate (Typical)Values *</b>	<b>Design Values</b>
Compression Parallel	ASTM D198	1588 psi	540 psi
Compression Perpendicular	ASTM D143	1437 psi	540 psi
Bending Strength	ASTM D198	3280 psi	500 psi
Shear Strength	ASTM D143	1761 psi	360 psi
Modulus of Elasticity	ASTM D4761	412,000psi	200,000 psi
Modulus of Rupture	ASTM D4761	3280 psi	500 psi

\* Ultimate strength values are not meant for design analysis. Design values are for temperatures up to 130F (54C)

### 2.3 ACCESSORIES

- A. Fasteners:
  - a. Universal Hideaway Hidden Fasteners
  - b. Screws; Stainless Steel
- B. Railing – to match decking.  
C. Pickets – to match decking

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**PART 3 EXECUTION**

## 3.1 Installation

- A. Install according to Manufacture's installation guidelines.
- B. Cut, drill, and rout using carbide tipped blades
- C. Do not use composite wood material for structural applications

## 3.2 Cleaning

- A. Following cleaning recommendations by manufacturer.

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## **SECTION 07210 - BUILDING INSULATION**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Extruded polystyrene board.
  - 2. Blanket/Batt insulation

#### **1.02 DEFINITIONS**

- A. Thermal Resistance (R-value): The temperature difference in degrees F between the two surfaces of a material of given thickness, required to make 1 Btu of energy flow through 1 square foot of the material in 1 hour.

#### **1.03 SUBMITTALS**

- A. Product Data: Submit for each product specified in this section.

#### **1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Foamed Plastic Insulation: Minimize period between product delivery and actual installation. Protect against exposure to flame, sparks, or excessive heat. Minimize exposure to sunlight.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Provide manufacturer's standard preformed insulation units, sized for proper fit in indicated applications.
- B. Blanket/Batt Insulation: Where installation of blanket/batt insulation is indicated, glass fiber blanket/batt complying with requirements below.
- C. Extruded Polystyrene Board Insulation: Manufactured by extrusion process with integral high density skin:
  - 1. Type VII (ASTM C 578): 60.0 psi compressive strength.
  - 2. Total R-value: 5.
  - 3. Manufacturers: Products of the following manufacturers or approved equal, provided they comply with requirements of the contract documents, will be among those considered acceptable:
    - a. Amoco Foam Products Company.
    - b. Dow U.S.A.
    - c. DiversiFoam Products Company.
    - d. UC Industries, Inc.

#### **2.02 ACCESSORIES**

- A. Provide accessories as necessary to properly install specified products.
  - Adhesive: Insulation manufacturer's recommended adhesive, complying with fire performance requirements.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Comply with insulation manufacturer's recommendations and installation sequence. Provide permanent placement and support of insulation.

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- B. Install materials in a manner which will maximize continuity of thermal envelope. Use a single layer of insulation wherever possible to achieve indicated requirements, unless otherwise indicated.
- C. Insulation Boards:
  - 1. Extruded polystyrene insulation:
    - a. Miscellaneous as needed.
- D. Insulation Blankets/Batts:
  - 1. Application: Metal-framed construction:
    - a. Unfaced insulation: Friction-fit insulation between framing members.
    - b. Support ceiling insulation with plastic mesh.

**END OF SECTION 07210**

## **SECTION 07462 – FIBER CEMENT SIDING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Fiber cement shake siding, panels, single, trim, and accessories;

#### **1.2 RELATED SECTIONS**

- A. Section 06100 - Rough Carpentry: Wood framing and bracing.
- B. Section 06100 - Rough Carpentry: Sheathing.

#### **1.3 REFERENCES**

- A. ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.
- B. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

#### **1.4 SUBMITTALS**

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

#### **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish areas designated by Architect.
  - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

## 1.7 PROJECT CONDITIONS

- A. 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 absolute limits.

## 1.8 WARRANTY

- A. Product Warranty: Limited, non-pro-rated product warranty.
  - 1. Shingle siding for 30 years.
  - 2. Trim boards for 15 years.
- B. Workmanship Warranty: Application limited warranty for 2 years.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer:
  - 1. James Hardie-Artisan Lap and Accent Trim, Hardi Panel and Hardi-trim
  - 2. CertainTeed
  - 3. Nichiha
- B. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01600.

### 2.2 SIDING

- A. Siding requirement for Materials:
  - 1. Fiber-cement Siding - complies with ASTM C 1186 Type A Grade II.
  - 2. Fiber-cement Siding - complies with ASTM E 136 as a noncombustible material.
  - 3. Fiber-cement Siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
  - 4. Warnock Hersey Product Listing.
  - 5. Manufacturer's Technical Data Sheet.
- B. Shingle Siding: Individual shingles, installed with straight edge
  - 1. Type: Texture 15 -1/4 inches (184 mm) with 6 inches exposure.
- C. Trim:
  - 1. Trim boards
    - a. Product: Batten Boards, 2-1/2 inch (63 mm) width, smooth texture.
    - b. Product: 5/4 Boards, width varies, smooth texture
    - c. Product: 1-1/2" thick trim for adjacent to heavy lap siding
    - d. Length: 12 feet (3658 mm).

### 2.3 FASTENERS

- A. Framing Fasteners: see manf. requirements
- B. Masonry Walls:
  - 1. Masonry Walls: Aerico Stud Nail, ET&F ASM No.-144-125, 0.14 inch (3.6 mm) shank by 0.30 inch (7.6 mm) head by 2 inches (51 mm) long corrosion resistant nails.

### 2.4 FINISHES

- A. Factory Primer: Provide factory applied universal primer.



## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### **3.2 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Install a water-resistive barrier is required in accordance with local building code requirements.
- D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.
- E. Openings and penetrations to be properly flashed

### **3.3 INSTALLATION - Shingle Siding**

- A. Install materials in strict accordance with manufacturer's installation instructions.
- B. Starting: Install a 1-1/4 inch starter strip and a 8-1/4" wide fiber cement plank siding starter course.
- C. Install first shingle from the end abutting trim. Install widest part of shingle placed downwards.
- D. Secure shingle, leaving a 1/8" gap for caulk at trim and continue the course along the wall.
- E. Start the second course, leaving a minimum lap of 1-1/2" between successive courses, again from the end abutting the trim. Repeat previous step.
- F.
- G. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- H. Maintain clearance between siding and adjacent finished grade.
- I. Wind Resistance: see structural requirements
- J. Face nail to sheathing under lap minimum 3/8" from edge.

### **3.4 INSTALLATION – Trim Boards**

- A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
- B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
- C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.
- D. Maintain clearance between trim and adjacent finished grade.
- E. Trim inside corner with a single board trim both side of corner.
- F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.
- G. Allow 1/8 inch gap between trim and siding.
- H. Seal gap with high quality, paint-able caulk.

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- I. Shim frieze board as required to align with corner trim..
- J. Fasten through overlapping boards. Do not nail between lap joints.
- K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten HardieTrim boards to HardieTrim boards.
- L. Shim frieze board as required to align with corner trim.

### **3.5 FINISHING**

- A. Finish primed siding with a two coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.
- B. Finish factory primed siding with a two coat of high quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

### **3.6 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

## **SECTION 07625 - SHEET METAL GUTTERS AND DOWNSPOUTS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Gutters and downspouts for the renovated **Rest Area and Visitor's Center building**.

#### **1.02 SUBMITTALS**

- A. Product Data.
- B. Samples: Submit 3x6 -inch samples of each type of metal and finish required.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Prefinished Aluminum Sheet: ASTM B 209, manufacturer's standard alloy and temper for indicated applications.
  - 1. Minimum thickness: 0.027 inch thick, unless indicated otherwise.
  - 2. Finish: 70 percent "Kynar 500" or "Hylar 5000" resin finish over epoxy primer; minimum system thickness 1.0 mil. Provide manufacturer's standard prime coat on underside.
    - a. Color: to be determined.
  - 3. Provide strippable plastic protective film on prefinished surface.

#### **2.02 ACCESSORY MATERIALS**

- A. Fasteners: Corrosion-resistant metal of same material as the material being fastened, or other material recommended by sheet metal manufacturer. Match finish and color of exposed fastener heads to finish and color of sheet material being fastened.
- B. Joint Adhesive: Two-component noncorrosive epoxy adhesive, recommended by metal manufacturer for sealing of nonmoving joints.
- C. Bituminous Coating: Heavy bodied, sulfur-free, asphalt-based paint; FS TT-C-494.

#### **2.03 FABRICATION - GENERAL**

- A. Form sheet metal to match profiles indicated, substantially free from oil-canning, fish-mouths, and other defects.
- B. Comply with SMACNA "Engineer rural Sheet Metal Manual" for applications indicated.
- C. Conceal fasteners and expansion provisions wherever possible.
  - 1. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
- D. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
  - 1. Gage: As recommended by SMACNA or metal manufacturer for application, but in no case less than gage of metal being secured.

#### **2.04 GUTTERS AND DOWNSPOUTS**

- A. Fabricate from prefinished aluminum sheet.
  - 1. Gutter: see roof plan for size.
  - 2. Downspouts: see roof plan for size.
- B. Provide expansion joints in gutters at spacing not to exceed 30 feet.
- C. Provide sheet metal baffles 6 inches high with legs 18 inches long at gutter corners below roof valleys.
- D. Gutter Supports: Brackets.
- E. Downspout Supports: Brackets.

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## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. General: Except as indicated otherwise, comply with sheet metal manufacturer's installation instructions and recommendations in the SMACNA "Architectural Sheet Metal Manual."

### **3.02 CLEANING AND PROTECTION**

- A. Repair or replace work which is damaged or defaced, as directed by the Engineer.
- B. Protect sheet metal work as recommended by the installer so that completed work will be clean, secured, and without damage at substantial completion.

**END OF SECTION 07625**

## **SECTION 07900 - JOINT SEALERS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. The sealing of joints indicated on schedule at the end of this section.
  - 2. The sealing of other joints indicated on drawings.
- B. Joints of a nature similar to that of joints indicated on the schedule shall be sealed with same sealer, whether indicated on drawings to be sealed or not.

#### **1.02 DEFINITIONS**

- A. Substrates:
  - 1. M-type substrates: Concrete, concrete masonry units, brick, mortar, natural stone. The term "masonry" means brick, stone, and concrete masonry work.
  - 2. G-type substrates: Glass and transparent plastic glazing sheets.
  - 3. A-type substrates: Metals, porcelain, glazed tile, and smooth plastics.
  - 4. O-type substrates: Wood, unglazed tile; substrates not included under other categories.

#### **1.03 SUBMITTALS**

- A. Product data.
- B. Samples for Color Selection. (Products exposed to view only.)

#### **1.04 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install sealers if any of the following conditions exist:
  - 1. Air or substrate temperature exceeds the range recommended by sealer manufacturers.
  - 2. Substrate is wet, damp, or covered with snow, ice, or frost.
- B. Dimensional Limitations: Do not install sealers if joint dimensions are less than or greater than that recommended by sealer manufacturer; notify the Engineer and get sealer manufacturer's recommendations for alternative procedures.

#### **1.05 WARRANTY**

- A. Submit Manufacturer's written warranty for failures in sealer work that occur within 5 years after substantial completion, without reducing or otherwise limiting any other rights to correction which the owner may have under the contract documents. Failure is defined as failure to remain weather-tight due to faulty materials. Correction is limited to replacement of sealers.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS - GENERAL**

- A. General: Provide only products which are recommended and approved by their manufacturer for the specific use to which they are put and which comply with all requirements of the contract documents.
  - 1. Provide only materials which are compatible with each other and with joint substrates.
  - 2. Colors of exposed sealers: As selected by the Engineer from manufacturer's standard colors.
- B. Manufacturers: Products of the manufacturers listed or approved equal, provided they comply with requirements of the contract documents will be among those considered acceptable.
  - 1. Silicone sealants:

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- a. Dow Corning Corporation.
- b. Pecora Corporation.
- c. GE Silicones.

## **2.02 ELASTOMERIC SEALANTS**

- A. Elastomeric Sealants - General: Chemically curing elastomeric sealants of types indicated, complying with ASTM C 920, including specific Type, Grade, Class, and Uses indicated, as well as all other requirements specified.
  1. Where movement capability exceeding that measured by ASTM C 920 is specified, sealant shall withstand the total movement indicated while remaining in compliance with the other requirements specified, when tested in accord with ASTM C 719, with base joint width measured at the time of application.
  2. For M-type substrates: Comply with requirements for Use M.
  3. For G-type substrates: Comply with requirements for Use G.
  4. For A-type substrates: Comply with requirements for Use A.
  5. For O-type substrates: Comply with requirements for Use M (minimum) and Use O for the particular substrate.
- B. Medium Movement Silicone Sealant: One- or two-part non-acid-curing, Grade NS, Class 25, Use NT, plus movement capability of more than 25 percent but less than 50 percent in both extension and compression.
- C. Mildew-Resistant Silicone Sealant: One-part, Type S, Grade NS, Class 25, Use NT, formulated with fungicide, for interior use on nonporous substrates, color to match glazed wall tile.

## **2.03 SILICONE-LATEX SEALANTS**

- A. Silicone-Latex Emulsion Sealant: One-part, nonsag, mildew-resistant, paintable at H.M. frames and gray to match wall tile; complying with ASTM C 834 use at fiber-cement siding and panel joints.

## **2.04 SEALANT BACKERS**

- A. Backers - General: Nonstaining; recommended or approved by sealant manufacturer for specific use.

# **PART 3 - EXECUTION**

## **3.01 PREPARATION**

- A. Do not begin joint sealer work until unsatisfactory conditions have been corrected.
- B. Masking Tape: Use masking tape to keep primers and sealers off of adjacent surfaces which would be damaged by contact or by cleanup. Remove tape as soon as practical.

## **3.02 INSTALLATION**

- A. Comply with sealer manufacturers' installation instructions and recommendations, except where more restrictive requirements are specified.

## **3.03 SCHEDULE OF JOINT SEALERS**

- A. Exterior Joints at fiber-cement siding and panel joints.
  1. Use Silicone-Latex sealants, paintable type.
  2. Joint shape: Concave joint configuration.
- B. Interior inside corners of all glazed tile walls; Mildew-Resistant Silicone Sealant color to match tile.
- C. Interior Joints for Which No Other Sealer Is Indicated:
  1. Use one of the following sealants:

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- a. Use Silicone-Latex sealants, paintable type.
  - b. Mildew-resistant silicone sealant at all ceramic tile corners (color to match gray wall tile) and at fixtures.
2. Use bond-breaker tape.
  3. Joint shape: Concave joint configuration.

**END OF SECTION 07900**

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## **SECTION 08110 - FIBERGLASS DOORS AND FRAMES**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Fiberglass Entrance Doors.

#### **1.02 REFERENCES**

- A. American Architectural Manufacturer Association (AAMA):
  - 1. AAMA 1304; Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems.
  - 2. AAMA 1702.2-12; Voluntary Standard for Utilization in Manufactured Housing for Primary Windows and Sliding Glass Door
- B. ASTM International:
  - 1. ASTM E283; Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  - 2. ASTM E330; Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Pressure Difference.
  - 3. ASTM E331; Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
  - 4. ASTM E 1886; 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.
  - 5. ASTM E 1996; Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
- C. National Fenestration Rating Council (NFRC):
  - 1. NFRC 100; Procedure for Determining Fenestration Thermal Properties.
  - 2. NFRC 200; Solar Heat Gain Coefficient and Visible Transmittance.

#### **1.03 SUBMITTALS**

- A. Product Data: Submit manufacturer's printed product information indicating compliance with specified requirements.
- B. Shop Drawings: Submit drawings for fabrication and installation of specified items, coordinated with opening schedule included in contract documents.
- C. Quality Assurance Submittals:
  - 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
  - 2. Manufacturer Instructions: Provide manufacturer's written installation instructions.

#### **1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: Minimum 2 years installing similar assemblies.
- B. Certifications: NAMI certification label indicating assemblies meet the design requirements.

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## 1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.
- B. Deliver and store assembly materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
  - 1. Protect from damage and exposure to direct sunlight during storage.
  - 2. Store in a dry, well-ventilated area off of the floor.
  - 3. During storage, do not remove paper or cardboard placed between products for shipment.
  - 4. Store in a humidity and temperature controlled facility. Recommended conditions: 30 to 50 percent relative humidity and 50 to 90 degrees F (10 to 32 degrees C).
- C. Handling: Handle with clean hands and equipment. Lift and carry the products when moving them. Do not drag across one another.

## 1.06 PROJECT CONDITIONS

- A. Maintain environmental conditions; temperature, humidity, and ventilation, within limits recommended by manufacturer for optimum results. Install only in vertical walls and when conditions are dry. Do not install products under environmental conditions outside manufacturer's recommended limits.

## 1.07 WARRANTY

- A. Manufacturer's Standard Warranty: Assemblies will be free from defects in materials and workmanship from the date of manufacture for the time periods indicated below:
  - 1. Door Slab: Lifetime Limited.
  - 2. Door System: Lifetime Limited.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Manufacturers: Products of the following manufacturers or approved equal, provided they comply with requirements of the contract documents, will be among those considered acceptable:
  - 1. JELD-WEN, Inc..
  - 2. Therma-tru.
  - 3. Pella.

### 2.02 MATERIALS

- A. Fiberglass Panel Door, Insulated, Paintable.
- B. Impact Resistance-Doors capable of resisted impact from windborne debris, when tested in accordance with ASTM E1886 and ASTM E1996.
- C. NFRC requirements-Provide doors capable of complying with the following door ratings:
  - 1. U-factor: 0.45 in accordance with NFRC 100.
  - 2. Solar Heat Gain Coefficient (SHGC): 0.33 in accordance with NFRC 200.
- D. Prep for hardware as specified.
- E. Windborne Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996, and

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requirements of authorities having jurisdiction.

### **2.03 FRAMES**

- A. Profile as shown on drawings
- B. Jamb: Solid Pine, primed-width to match existing
- C. Interior wood casing to match existing
- D. Exterior trim to be fiber cement
- E. Aluminum to meet ANSI A117.1 requirements

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. General: Install doors, frames, and accessories to comply with manufacturer's recommendations.
  - 1. Comply with detailed installation requirements of final shop drawings.
- B. Frame Installation:
  - 1. Seal all exterior door frames with polyurethane foam sealant.
  - 2. Anchors: Provide 3 wall anchors per jamb at hinge and strike levels and minimum 18 gage base anchors.
  - 3. Fire-rated openings: Comply with requirements of NFPA 80.
- C. Door Installation:
  - 1. General: Comply with requirements and clearances specified.

### **3.02 ADJUST AND CLEAN**

- A. Touch-Up: At locations where primer has been abraded or minor rusting has occurred, sand smooth and spray-apply compatible primer.
- B. Final Operating Adjustments: Check hardware at all openings for proper operation of doors, making final corrections as required to assure that work of this section is complete and undamaged.

## **END OF SECTION 08160**

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## **SECTION 08310- ACCESS DOORS AND FRAMES**

### **PART 1 GENERAL**

#### **1.1 RELATED SECTIONS**

- A. Section 06100 - Rough Carpentry: Roof framing and opening support.

#### **1.2 SUBMITTALS**

- A. Submit under provisions of Section 01300.
- B. Manufacturer's data sheets, including:

#### **1.3 DELIVERY, STORAGE, AND HANDLING**

- A. Store attic access door hatch in manufacturer's unopened packaging until ready for installation.
- B. Store attic access door hatch until installation inside under cover in dry area out of direct sunlight.

#### **1.4 WARRANTY**

- A. Limited Warranty: One year against defective material and workmanship, covering parts only, no labor or freight. Defective parts, if deemed so by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant which warrants same.

### **PART 2 PRODUCTS**

#### **2.1 ACCESS DOOR AND FRAME**

- A. Non-rated attic access doors and frames
  1. Door: White mineral board face, extruded polystyrene (EPS) R-42 core 10" thick and rubber sealing gasket over top of EPS core. Door is pre-finished.
  2. Frame: plywood frame is installed in a wood framed rough opening. Frame is 12" tall and provides insulation dam.
  3. Trim: Tapered wood trim is pre-finished.
  4. Handles: Two recessed handles
  5. Seal: for air leakage
  6. Rigid insulation board

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

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- B. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

### **3.2 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.

### **3.3 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

**END OF SECTION**

## **SECTION 08410-METAL-FRAMED STOREFRONTS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Aluminum-framed storefront doors, sidelight, and door hardware.
- B. Perimeter sealant.

#### **1.02 REFERENCES**

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 1997.
- B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 1998.
- C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2002.
- D. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 1996.
- E. ASTM B 221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 1996.
- F. ASTM E 283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 1991.
- G. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference; 1997.
- H. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference; 1996.

#### **1.03 PERFORMANCE REQUIREMENTS**

- A. Design and size components to withstand the following load requirements without damage or permanent set, when tested in accordance with ASTM E 330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
  - 1. Design Wind Loads: Comply with requirements of ASCE 7.
  - 2. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
- B. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
- C. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E 283.
- D. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 2.86 lbf/sq ft.
- E. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- F. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
- G. Windborne Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996, and

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requirements of authorities having jurisdiction.

#### **1.04 SUBMITTALS**

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- D. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

#### **1.05 DELIVERY, STORAGE, AND PROTECTION**

- A. Handle products of this section in accordance with AAMA CW-10. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings, which bond to aluminum when exposed to sunlight or weather.

#### **1.06 ENVIRONMENTAL REQUIREMENTS**

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Kawneer Company; Product Tri-Fab 450 and 451; [www.kawneer.com](http://www.kawneer.com).
- B. Other Acceptable Manufacturers:
  - 1. United States Aluminum Corp.
  - 2. Vistawall Architectural Products: [www.vistawall.com](http://www.vistawall.com).

#### **2.02 COMPONENTS**

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
  - 1. Finish: High performance organic coating.
  - 2. Color: White, to be confirmed with architect.
- B. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior at exterior doors only, drainage holes and internal weep drainage system.
  - 1. Framing members for interior applications need not be thermally broken.
  - 2. Glazing stops: Flush.
  - 3. Cross-Section: 1-3/4 x 4-1/2 inch nominal dimension.
- C. Doors: Glazed aluminum.
  - 1. Thickness: 1-3/4 inches.
  - 2. Top Rail: 4 inches wide.
  - 3. Vertical Stiles: 4-1/2 inches wide.
  - 4. Bottom Rail: 12 inches wide.
  - 5. Glazing Stops: Beveled.
  - 6. Finish: Same as storefront.



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**2.03 MATERIALS**

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Perimeter Sealant: Type 1 specified in Section 07900.
- D. Glass: As specified in Section 08800.
  - 1. Glass in Exterior Framing and Doors: Type 2, 1" insulated glass.
- E. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- F. U-Factor: 0.45 max. and SHGC: 0.33 max.

**2.04 FINISHES**

- A. High Performance Organic Finish: AAMA 2604; multiple coats, thermally cured fluoropolymer system, 20-year finish.

**2.05 HARDWARE**

- A. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
- B. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
- C. Pivots: Center type; top and bottom; provide on all doors.
- D. Push/Pull Set: 1" bar, Hager No.160; provide on all doors.
- E. Threshold: Aluminum, 1/4" high maximum; provide on all doors.
- F. Closers: Surface mounted on interior.
  - 1. Provide on all doors.
- G. Locks: Dead latch with turn handle inside; keyed cylinder outside.
  - 1. Provide on all doors.

**2.06 FABRICATION**

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners and attachments to conceal from view.
- E. Reinforce components internally for door hardware.
- F. Reinforce framing members for imposed loads.
- G. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
  - 1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

**3.02 INSTALLATION**

- A. Install wall system in accordance with manufacturer's instructions.

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- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of mastic and secure.
- J. Install hardware using templates provided.
- K. Install glass in accordance with Section 08800, using glazing method required to achieve performance criteria.
- L. Install perimeter sealant in accordance with Section 07900.

### **3.03 ERECTION TOLERANCES**

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

### **3.04 ADJUSTING**

- A. Adjust operating hardware for smooth operation.

### **3.05 CLEANING AND PROTECTION**

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by method acceptable to sealant manufacturer.
- D. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

## **END OF SECTION**

## **SECTION 08553 – ALUMINUM CLAD WOOD WINDOWS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Aluminum-clad wood fixed frame windows.

#### **1.2 RELATED SECTIONS**

- A. Section 07250 - Air Barriers: Water-resistant barrier.
- B. Section 07900 - Joint Sealants: Sealants and caulking.

#### **1.3 REFERENCES**

- A. American Architectural Manufacturers Association (AAMA):
  - 1. AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Doors.
- B. National Fenestration Rating Council (NFRC):
  - 1. NFRC 100: Procedure for Determining Fenestration Thermal Properties.
  - 2. NFRC 200: Solar Heat Gain Coefficient and Visible Transmittance.
- C. Screen Manufacturers Association (SMA):
  - 1. SMA 1201 - Specifications for Insect Screens for Windows, Sliding Doors and Swinging Doors.
- D. Window and Door Manufacturers Association (WDMA):
  - 1. ANSI/AAMA/NWWDA 101/I.S.2 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.
  - 2. ANSI/AAMA/NWWDA 101/I.S.2/NAFS-02 - Voluntary Performance Specification for Windows, Skylights and Glass Doors.
  - 3. WDMA I.S.4 - Industry Standard for Water-Repellent Preservative Non-Pressure Treatment for Millwork.

#### **1.4 PERFORMANCE REQUIREMENTS**

- A. Provide windows capable of complying with requirements indicated, based on testing manufacturer's window that are representative of those specified and that are of test size required by ANSI/AAMA/NWWDA 101 I.S.2/NAFS
- B. Window Unit Air Leakage, ASTM E 283, 6.24 psf (50 mph):  
0.05 cfm per square foot of frame or less.
- C. Window Unit Water Penetration: No water penetration through window unit when tested in accordance with ASTM E 547, under static pressure of 14.2 psf (75 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 5 gallons per hour per square foot.
- D. NFRC Requirements
  - 1. U-factor: 0.45 in accordance with NFRC 100.
  - 2. Solar Heat Gain Coefficient (SHGC): 0.33 in accordance with NFRC 200.
  - 3. Visible Transmittance (VT):0.25 in accordance with NFRC 200.
- E. Windborne Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996, and requirements of authorities having jurisdiction.

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**1.5 SUBMITTALS**

- A. Comply with Division 1 requirements.
- B. Product Data: Submit manufacturer's product data, including installation instructions.
- C. Shop Drawings: Submit manufacturer's shop drawings, indicating dimensions, construction, component connections and locations, anchorage methods and locations, hardware locations, and installation details.
- D. Samples: Provide finish samples for all products.
- E. Warranty: Submit manufacturer's standard warranty.

**1.6 QUALITY ASSURANCE**

- A. Mockup:
  - 1. Provide sample installation for field testing window performance requirements and to determine acceptability of window installation methods.
  - 2. Approved mockup shall represent minimum quality required for the Work.
  - 3. Approved mockup shall remain in place within the Work.

**1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery: Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.
- B. Storage: Store materials in an upright position, off ground, under cover, and protected from weather, direct sunlight, and construction activities.
- C. Handling: Protect materials and finish during handling and installation to prevent damage.

**PART 2 PRODUCTS****2.1 MANUFACTURER**

- A. Pella Corporation, Andersen, Weather Shield

**2.2 ALUMINUM-CLAD WOOD FIXED FRAME WINDOWS**

- A. Aluminum-Clad Wood Windows: Architect Series factory-assembled clad wood windows with outward-opening sash installed in frame
- B. Frame:
  - 1. Select woods, water-repellent, preservative-treated with EnduraGuard® in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the frame.
  - 2. Interior Exposed Surfaces: Clear Pine
  - 3. Exterior Surfaces: Clad with aluminum
  - 4. Overall Frame Depth: 5 inches (127 mm).
- C. Weather Stripping:
  - 1. Dual weather stripping.
  - 2. Continuous, flexible, Santoprene material in dual-durometer design.
  - 3. Units shall have welded corners, compressed between frame and sash for positive seal on all 4 sides.
  - 4. Secondary PVC leaf-type weather strip between sash and frame for positive seals on all 4 sides.

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## **2.3 GLAZING**

- A. Glazing:
  - 1. Float Glass: ASTM C 1036, Quality 1.
    - a. Tempered Glass: ASTM C 1048.
  - 2. Type: Silicone-glazed 11/16-inch dual-seal, insulating glass, multi-layer Low-E coated with argon
  - 3. Integral Light Technology Glazing and Grilles:
    - a. Insulating glass contains non-glare grid between 2 panes of glass.
    - b. Finish: Finish color matches interior and exterior finish colors.

## **2.4 OPTIONS**

- A. Insect Screens: Standard.
  - 1. Compliance: ASTM D 3656 and SMA 1201.
  - 2. Screen Cloth: Vinyl-coated fiberglass, 18/16 mesh.
  - 3. Set in aluminum frame fitted to inside of window.
  - 4. Complete with necessary hardware.
  - 5. Screen Frame Finish: match
- B. Grilles-Between-the-Glass:
  - 1. Profile: 3/4 inch.
  - 2. Contoured aluminum grilles installed between 2 panes of the sealed insulating glass.
  - 3. Interior Grille Color: Ivory
  - 4. Exterior color: Tan

## **2.5 HARDWARE**

- A. Operator:
  - 1. Steel worm-gear operator with hardened gears.
  - 2. Operator Base: Zinc die cast with painted finish.
  - 3. Operator Linkage, Hinge Slide, and Hinge Arms: 300 series stainless steel.
  - 4. Exposed Fasteners: Stainless steel.
  - 5. External Hardware Salt Spray Exposure, ASTM B 117: Exceed 1,000 hours.
- B. Crank Handle Finish
  - 1. Integrated Folding Crank: Oil-rubbed bronze
- C. Locking System: SureLock System.
  - 1. Single-handle locking system.
  - 2. Operate positive-acting arms that reach out and pull sash into locked position.
  - 3. Awning Windows: One installed on sash 29 inches and smaller in frame width, 2 unison operating locks installed on sash over 29 inches in frame width.
  - 4. Lock Handle Finish: Oil -rubbed bronze

## **2.6 TOLERANCES**

- A. Windows shall accommodate the following opening tolerances:
  - 1. Vertical Dimensions Between High and Low Points: Plus 1/4 inch, minus 0 inch.
  - 2. Width Dimensions: Plus 1/4 inch, minus 0 inch.
  - 3. Building Columns or Masonry Openings: Plus or minus 1/4 inch from plumb.

## **2.7 FINISH**

- A. Exterior Finish System:
  - 1. Exterior aluminum clad surfaces
  - 2. Color: to be selected by architect.
- B. Interior Finish: Factory finished with 1 prime coat and 1 top coat color to be determined

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## **2.8 INSTALLATION ACCESSORIES**

- A. Flashing/Sealant Tape:
  - 1. Aluminum-foil-backed butyl window and door flashing tape.
  - 2. Maximum Total Thickness: 0.013 inch.
  - 3. UV resistant.
  - 4. Verify sealant compatibility with sealant manufacturer.
- B. Interior Insulating-Foam Sealant: Low-expansion, low-pressure polyurethane insulating window and door foam sealant.
- C. Exterior Perimeter Sealant: high quality, multi-purpose sealant as specified in the joints sealant section.

## **2.9 SOURCE QUALITY CONTROL**

- A. Factory Testing: Factory test individual standard operable windows for air infiltration in accordance with ASTM E 283, to ensure compliance with this specification.

# **PART 3 EXECUTION**

## **3.1 EXAMINATION**

- A. Examine areas to receive windows. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

## **3.2 INSTALLATION**

- A. Install windows in accordance with manufacturer's instructions and approved shop drawings.
- B. Install windows to be weather-tight and freely operating.
- C. Maintain alignment with adjacent work.
- D. Secure assembly to framed openings, plumb and square, without distortion.
- E. Integrate window system installation with exterior water-resistant barrier using flashing/sealant tape. Apply and integrate flashing/sealant tape with water-resistant barrier using watershed principles in accordance with window manufacturer's instructions.
- F. Place interior seal around window perimeter to maintain continuity of building thermal and air barrier using insulating-foam sealant.
- G. Seal window to exterior wall cladding with sealant and related backing materials at perimeter of assembly.
- H. Leave windows closed and locked.

## **3.3 CLEANING**

- A. Clean window frames and glass in accordance with Division 1 requirements.
- B. Do not use harsh cleaning materials or methods that would damage finish.
- C. Remove labels and visible markings.

## **3.4 PROTECTION**

- A. Protect installed windows to ensure that, except for normal weathering, windows will be without damage or deterioration at time of substantial completion.

**END OF SECTION**

## **SECTION 08710 - DOOR HARDWARE**

### **PART 1 - GENERAL**

#### **1.01 SUBMITTALS**

- A. Product Data.
- B. Final Hardware Schedule.
- C. Keying Schedule: Separate schedule showing how each lock is keyed.

#### **1.02 REQUIREMENTS**

- A. Hardware shall comply with the requirements of NCSBC 2013-chapter 11 and ANSI A117.1-2009.

### **PART 2 - PRODUCTS**

- A. Latching and Locking Devices: Mortise locks, unless otherwise indicated, with appropriate locking function; provide on every door.

#### **2.01 MATERIALS – GENERAL**

- A. Manufacturers:
  - 1. Where a particular manufacturer's product is specified, products of other manufacturers will be considered for substitution.
- B. Fasteners: Provide hardware prepared by the manufacturer with fastener holes for machine screws, unless otherwise indicated.
  - 1. Provide all fasteners required for secure installation.
  - 2. Select fasteners appropriate to substrate and material being fastened.
  - 3. Use wood screws for installation in wood.
  - 4. Use fasteners impervious to corrosion outdoors and on exterior doors.
  - 5. Exposed screws: Match hardware finish.
- C. Finish on All Exposed Metal Items: Satin chrome plated (626).
  - 1. Exceptions:
    - a. Plates and bars: Satin stainless steel (630).
    - b. Hinges: Where steel hinges are acceptable, use matching plated finish.
    - c. As indicated for specific items.

#### **2.02 LOCKS, LATCHES, AND BOLTS**

- A. Mortise Locksets and Latchsets:
  - 1. Comply with requirements of BHMA A156.13, Operational Grade 2.
    - a. Security Grade 1.
  - 2. Trim: Cast lever with escutcheon plate.
- B. Strikes: Provide strike for each latch bolt and lock bolt.
  - 1. Finish to match other hardware on door.
  - 2. Use wrought box strikes with curved lips unless otherwise indicated.
  - 3. Open strike plates may be used on interior wood door frames.

#### **2.03 LOCK CYLINDERS AND KEYING**

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- A. Keying: Obtain the owner's keying instructions.
  - 1. Match existing master key system.
  - 2. Provide standard cylinders for locks on all doors, unless otherwise indicated.
- B. Cylinders: Minimum 7-pin pin tumbler cylinders.
  - 1. Construction: All parts brass, bronze, nickel silver or stainless steel.
  - 2. Cylinders made by manufacturers other than the lockset manufacturer will not be acceptable.
- C. Keys: Nickel silver.
  - 1. Stamp each key with manufacturer's change symbol.
  - 2. Provide individual change key for each lock which is not designated to be keyed alike with a group of related locks.
  - 3. Provide 3 of each change key. Master key system shall match existing: 5 master keys.

## 2.04 DOOR CONTROL DEVICES

- A. Closers - General:
  - 1. Use closers of sizes recommended by manufacturer, unless a larger size is specified.
  - 2. Size closer or adjust closer opening force to comply with applicable codes.
- B. Surface-Mounted Closers:
  - 1. Comply with requirements of BHMA A156.4, Grade 2.
    - a. Provide the following features:
      - 1. PT 4D: Adjustable hydraulic back check.
      - 2. PT 4F: Delayed action.
  - 2. Style: CO2021.
  - 3. Parallel arms: Provide for all closers; use larger size than normal.
    - 1. Finish: Metallic paint finish, color similar to metal hardware on same door.
- C. ElectroHydraulic automatic operators.
  - 1. Comply with ANSI 156.19 (knowing act activated)
- D. Wall/Floor-Mounted Stops/Holders: Comply with requirements of ANSI A156.16.
  - 1. Floor-mounted stops: Style: L12121.
  - 2. Resilient bumpers: Gray.

## 2.05 SEALS AND THRESHOLDS

- A. Weatherstripping:
  - 1. At jambs and head: Replaceable bumper in surface-mounted extruded aluminum housing.
    - a. Bumper: Solid neoprene, hollow bulb or loop.
  - 2. At bottom: Replaceable sweep in surface-mounted extruded aluminum housing.
    - a. Sweep: Solid neoprene.
  - 3. Housing finish: Natural anodized.
- B. Thresholds: Ribbed aluminum.
  - 1. Select style to suit changes in elevation and to fit door hardware and frames.
  - 2. Interlocking hook type threshold: Hook strip on bottom of door, interlocking with top lip of threshold.
    - a. At doors that swing in, provide internal drain and drain pan.
- C. Sealant for Setting Thresholds: Butyl-rubber or butyl-polyisobutylene sealant.

## 2.06 ARCHITECTURAL DOOR TRIM

- A. Manufacturers:
  - 1. Architectural door trim: Products of the following manufacturers, or approved equal, provided they comply with requirements of the contract documents, will be among those considered acceptable:
    - a. Yale Security, Inc.



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- b. Hiawatha, Inc.
  - c. H. B. Ives, a Harrow Company.
  - d. Rockwood Manufacturing Company.
  - e. Triangle Brass Manufacturing Company, Inc.
- B. Push / pulls:
- 1. Decorative pulls: 1 inch round bars, radius ends, vertical(pull side) and horizontal(push side), 12 & 32 inches long respectively.
  - 2. Pull handles which are not mounted on plates: Fasten with through-bolts concealed under plate on opposite side.
  - 3. Where matching handles or bars are installed on each side of door, mount back-to-back with concealed fasteners.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Factory- or shop-prepare all work for installation of hardware.

### **3.02 INSTALLATION**

- A. Follow hardware manufacturer's recommendations and instructions.
- B. Mount at heights specified in the Door and Hardware Institute's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 1. Exception(s): As required by applicable regulations.
- C. Install hardware in correct location, plumb and level.
- D. Reinforce substrates as required for secure attachment and proper operation.
- E. Thresholds: Apply continuous bead of sealant to all contact surfaces before installing.

### **3.03 ADJUSTMENT**

- A. Adjust each operable unit for correct function and smooth, free operation.
- B. Adjust door closers to overcome air pressure produced by HVAC systems.
- C. If hardware adjustment is completed more than one month before substantial completion, readjust hardware not more than one week before substantial completion.

### **3.04 CONTRACT CLOSEOUT**

- A. Deliver all keys to the owner.

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**PART 4 - SCHEDULE**

Manufacturers Code Name:

Ad	Adams Rite	Na	National Guard
Gl	Glynn Johnson	Ro	Rockwood
Ha	Hager	Sa	Sargent
Mc	McKinney		

**Group # 1**

2 Continuous Hinge	MCK-12HD 83	BZ	Mc	Pemko or Ives Equivalent
2 Flush Bolts	555	US10B	Ro	Ives or Hager Equivalent
1 Deadlock	MS1851SW	313	Ad	Schlage or Sargent Equivalent
1 Thumb Turn Cyl	4066 X 1 1/8"	313	Ad	Schlage or Sargent Equivalent
1 Mortise Cylinder	21 41 1 1/8 Gmk X 3 Keys	US10B	Sa	Schlage or Adams Rite Equivalent
2 Push/Pull Set	RM252 X 33"	US10B	Ro	Ives or Hager Equivalent
2 Closer	281 PS	US10B	Sa	LCN or Dorma Equivalent
2 Door Operator	4640		LCN	Dorma or Assa Abloy Equivalent
2 Cylinder	4642-3071CS		LCN	Dorma or Assa Abloy Equivalent
2 Arm	3077L with metal cover		LCN	Dorma or Assa Abloy Equivalent
1 Control Box Assembly	4640-3462		LCN	Dorma or Assa Abloy Equivalent
1 Saddle Threshold	425 E X 72"	AL	Na	Pemko or Hager Equivalent
Neoprene gasket				
Drip cap				

**Group # 2**

2 Continuous Hinge	MCK-12HD 83	BZ	Mc	Pemko or Ives Equivalent
2 Flush Bolts	555	US10B	Ro	Ives or Hager Equivalent
1 Deadlock	MS1851SW	313	Ad	Schlage or Sargent Equivalent
1 Thumb Turn Cyl	4066 X 1 1/8"	313	Ad	Schlage or Sargent Equivalent
1 Mortise Cylinder	21 41 1 1/8 Gmk X 3 Keys	US10B	Sa	Schlage or Adams Rite Equivalent
2 Push/Pull Set	RM252 X 33"	US10B	Ro	Ives or Hager Equivalent
2 Closer	281 PS	US10B	Sa	LCN or Dorma Equivalent
1 Saddle Threshold	425 E X 72"	AL	Na	Pemko or Hager Equivalent
Neoprene gasket				

**Group #3**

3 Hinges	TA 2314 4 1/2 X 4 1/2	US32D	Mc	Pemko or Ives Equivalent
1 Passage set	8200-66 LNJ X	US32D	Sa	Schlage or Sargent Equivalent
1 Closer	281 PS	26D	Sa	LCN or Dorma Equivalent
1 Protection Plate	K1050 10" X 34"	US32D	Ro	Von Duprin or Hager Equivalent
3 Door Silencer	GJ64	Gray	Gl	Ives or Rockwood Equivalent
1 Wall Bumper	409	US32d	Ro	Ives or Rockwood Equivalent

**Group # 4**

3 Hinges	TA 2314 4 1/2 X 4 1/2	US32D	Mc	Pemko or Ives Equivalent
1 ADA cup pull	27P	US32D	Ha	Don-Jo or Burns Manuf. Equivalent
1 Thumb Turn Cyl	TBD	313	Ad	Schlage or Sargent Equivalent
1 Mortise Cylinder	TBD	313	Ad	Schlage or Sargent Equivalent
1 Closer	281 O	26D	Sa	LCN or Dorma Equivalent
1 Protection Plate	K1050 10" X 34"	US32d	Ro	Von Duprin or Hager Equivalent
3 Door Silencer	GJ64	Gray	Gl	Ives or Rockwood Equivalent

**Group #5**

3 Hinges	TA 2314 4 1/2 X 4 1/2	US32D	Mc	Pemko or Ives Equivalent
1 Lockset	8237-27 LNJ X 3 Keys	US32D	Sa	Schlage or Best Access Equivalent
1 Closer	281 PS	26D	Sa	LCN or Dorma Equivalent
1 Protection Plate	K1050 10" X 34"	US32D	Ro	Von Duprin or Hager Equivalent
3 Door Silencer	GJ64	Gray	Gl	Ives or Rockwood Equivalent
1 Wall Bumper	409	US32d	Ro	Ives or Baldwin Equivalent

**END OF SECTION 08710**

## **SECTION 08800 – GLAZING**

### **PART 1 – GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Insulated, display, and obscure glass.
  - 2. Glazing accessories.
- B. Types of work in this section include work for:
  - 1. Exterior entry door and sidelights; see Section 08410-Metal-Framed Storefronts.
  - 2. Sliding glass entry door; see Section 08460.

#### **1.02 PERFORMANCE REQUIREMENTS**

- A. Exterior Glazing: Provide glazing assemblies which will withstand normal conditions without failure, loss of weathertightness, or deterioration.
- B. Deterioration includes:
  - 1. For insulating glass:
    - a. Moisture or dirt between panes.
    - b. Development of condensation between panes.
    - c. Damage to internal coating, if any.
    - d. Development of other visible indication of seal failure.
  - 2. For laminated glass: Development of visible delamination.

#### **1.03 SUBMITTALS**

- A. Product Data.
- B. Insulating Unit Warranty.

#### **1.04 WARRANTY**

- A. Warranty on Insulating Glass: Fabricator's standard warranty for 5 years.

### **PART 2 – PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Manufacturers:
  - 1. Laminated glass: Products of the following manufacturers or approved equal, provided they comply with requirements of the contract documents, will be among those considered acceptable:
    - a. Falconer-Lewistown, Inc.
    - b. Globe Amerada Glass Company.
    - c. Guardian Industries Corporation.
    - d. Viracon, Inc.

#### **2.02 GLASS TYPES**

- A. Glass Types - General: Provide glass types fabricated of the glass products indicated.

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1. Exterior glass thickness: 6 mm (1/4 inch nominal), unless otherwise indicated.
  2. Where safety glazing is required by governing authorities, provide certified safety glazing.
  3. Cut or drill holes in laminated units.
- B. Glass Type I - 1: Sealed insulating units at sliding and storefront entry doors and sidelights.
1. Total thickness: 1 inch, nominal.
  2. Exterior and Interior pane: **Laminated glass**.
    - a. Two-ply.
    - b. Thickness of plies: 6 mm.
    - c. All plies: **Heat-strengthened float glass**.
    - d. Color: Outer and inner ply: Clear.
    - e. Interlayer thickness: 0.05 inch.
    - f. Shading coefficient: 0.91.
    - g. Winter U-value: 0.32, minimum.
- C. Glass Type SG - 2: Display case Polycarbonate sheet, with mar-resistant coating; thickness: ¼ inch.
1. Provide certified safety glazing and use at display cases.
  2. Color: Clear.
    1. Acceptable glazing methods: Sealant, both sides.
- D. Glass Type SG - 3: Obscure glass at Unisex Restroom door; thickness: ¼ inch safety glass.

### 2.03 BASIC GLASS PRODUCTS

- A. Sealed Insulating Units: Factory-assembled multiple panes separated by and sealed to spacers forming air-tight, dehydrated air space(s).
1. ASTM E 774, Class B.
  2. Spacer seals: Manufacturer's standard.
  3. Exception: For structural adhesive glazed units use only a dual seal system, using materials determined by structural adhesive manufacturer to be compatible with structural adhesive.
- B. Float Glass: Quality q3, unless otherwise indicated.
1. Heat-strengthened: ASTM C 1048, Kind HS, Type I.
- C. Laminated Units: Multiple plies laminated together with interlayer, using heat and pressure, without air pockets or contaminants between plies.
1. Interlayer for all-glass units: Polyvinyl butyral sheet, specifically designed for lamination and with demonstrated long-term ability to maintain physical and visual properties under installed conditions.
- D. Polycarbonate Sheet: Rigid, flat polycarbonate sheet; thicknesses as indicated.
1. Flammability: Average extent of burning less than 1 inch, when tested in accordance with ASTM D 635, using the thickness of material to be used on the project.
  3. UV- and mar-resistant coating: Apply on all surfaces exposed to air.
- A. Window Grilles: Provide coated aluminum grilles with in lights match exterior color of frame.

### 2.04 INSTALLATION MATERIALS

- A. Installation Materials - General: Select products which have appropriate performance characteristics as recommended by glass and glazing materials manufacturers and which are compatible with all materials with which they will come into contact.
- B. Heel and Toe Bead Sealant: Noncuring, nonskinning, minimum 75 percent solids, butyl or polyisobutylene rubber, complying with 802.3, Type II ductile back bedding compound, as described in AAMA 800.

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## **PART 3 – EXECUTION**

### **3.01 INSTALLATION - GENERAL**

- A. Comply with recommendations for installation contained in the FGMA "Glazing Manual" and "Sealant Manual" except when specifically not recommended or prohibited by the glass or glazing material manufacturer; comply with manufacturer's recommendations.
- B. Protect glazing from edge damage during handling and installation.
- C. Do not install glass that has edge damage or defects that reduce glass strength or performance or diminish appearance.

### **3.02 GLAZING IN FRAMES**

- A. Use continuous heel or toe bead at all exterior glazing.
- B. Do not block weep holes.
- C. Structural Adhesive Glazing: Perform glazing in strict accordance with instructions of structural glazing adhesive manufacturer and additional requirements elsewhere in the contract documents.

### **3.03 PROTECTION AND CLEANING**

- A. Cover exposed polycarbonate surfaces with heavy paper secured with tape, without touching glazing.
  - 1. Clean polycarbonate surfaces using only methods recommended by manufacturer.

## **END OF SECTION 08800**

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## **SECTION 08900 - LOUVERS AND VENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Hurricane louver

#### **1.2 PERFORMANCE REQUIREMENTS**

- A. Design: Design louvers, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.
  - 1. Wind Loads: Determine loads based on a uniform pressure of 30 lb./sq. ft. (1435 Pa), acting inward or outward.
- C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.
  - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
- C. Samples: For each type of metal finish required.
- D. Submittal: For louvers indicated to comply with structural performance requirements and design criteria indicated.
- E. Product Test Reports: Based on tests performed according to AMCA 500-L

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. Aluminum Extrusions: ASTM B 221M, Alloy 6063-T5.
- B. Aluminum Sheet: ASTM B 209M, Alloy 3003 with temper as required for forming.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
  - 1. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.

#### **2.2 FABRICATION, GENERAL**

- A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

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## **2.3 PERFORMANCE**

- A. Horizontal High Performance Louver:
  - 1. Wind Driven Rain Louver-acceptable manufacturers
    - a. Carnes-FSWC
    - b. American Warning & Ventilating
    - c. Greenheck
  - 2. Louver Depth: 5.1 inches
  - 3. Blade Profile: .063 extruded aluminum on approx.. 2" centers, drainable
  - 4. Frame and Blade Nominal Thickness: Not less than for blades and for frames.
  - 5. Louver Performance Ratings:
  - 6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
  - 7. Special Shapes
  - 8. Finish: Kynar selected by Architect

## **2.4 LOUVER SCREENS**

- A. General: Provide screen at each exterior louver.
- B. Louver Screen Frames: Same kind and form of metal as indicated for louver to which screens are attached.
- C. Louver Screening: Same kind of metal as indicated for louver.

## **2.5 BLANK-OFF PANELS**

- A. Uninsulated, Blank-Off Panels: Laminated panels consisting of insulating core surfaced on back and front with metal sheets and attached to back of louver.
  - 1. Seal perimeter joints between panel faces and louver frames with gaskets or sealant.
  - 2. Panel Finish: Same type of finish applied to louvers.
  - 3. Attach blank-off panels with sheet metal screws.
  - 4. Provide blank-off panel for entire louver surface. Ductwork connections to be cut in field.

## **2.6 ALUMINUM FINISHES**

- A. finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufactures' written instructions.
  - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

# **PART 3 - EXECUTION**

## **3.1 INSTALLATION**

- A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.
- E. Protect galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.

**END OF SECTION 08 90 00**



## **SECTION 09252 - CEMENTITIOUS BACKER BOARD**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Fiber cement backer board panels.

#### **1.2 RELATED SECTIONS**

- A. Section 06100 - Rough Carpentry: framing and bracing.
- B. Section 09260 - Gypsum Board: Vapor barrier material and installation requirements.

#### **1.3 REFERENCES**

- A. ANSI 108/A118/A136 - American National Standards for the Installation of Ceramic Tile.
- B. ANSI A108.11 - Installation of Cementitious Backer Units.
- C. ANSI A118.4 - Specifications for Latex Portland Cement Mortar
- D. ANSI A118.9- Cementitious Baker Units.
- E. ANSI A136.1 - Organic Adhesives for Installation of Ceramic Tile
- F. ASTM C1288 - Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets.

#### **1.4 SUBMITTALS**

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm) square, representing actual product, color, and patterns.

#### **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store boards flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.

#### **1.7 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 absolute limits.

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## 1.8 WARRANTY

- A. Product Warranty: limited product warranty against manufacturing defects:
  - 1. 1/2 inch (13 mm) nominal cement board for 20 years.
- B. Workmanship Warranty: application limited warranty for 2 years.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer:
  - 1. James Hardie Building Products, Inc.,
  - 2. National Gypsum
  - 3. Durock
- B. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01600.

### 2.2 BACKERBOARD

- A. Type: thickness varies
- B. Material shall meet the following building code compliance:
  - 1. Non-asbestos fiber-cement board to comply with ASTM C1288 and ANSI A118.9.
  - 2. Board shall meet the building code compliance National Evaluation Report No. NER 405.

### 2.3 FASTENERS

- A. Metal Framing fasteners
  - 1. Metal framing: 1-1/2 inches (32 mm) No. 8 by 0.375 inch (9.5 mm) HD self-drilling, corrosion resistant ribbed wafer head screws.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 WALL FRAMING

- A. Either vertical or horizontal, nominal 2 inches by 4 inches ( 51 mm by 102 mm) metal framing spaced a maximum of 24 inches (610 mm) on center with end joints staggered from adjacent courses in both vertical and horizontal applications.
- B. To comply with ANSI A108.11, either vertical or horizontal, nominal 2 inches by 4 inches ( 51 mm by 102 mm) metal framing spaced a maximum of 16 inches (406 mm) on center with end joints staggered from adjacent courses in both vertical and horizontal applications.
- C. Install a vapor barrier.
  - 1. Comply with building code regarding vapor barrier requirements.
  - 2. Repair any punctures or tears in vapor barrier prior to the installation of the board.

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### 3.3 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.

### 3.4 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Install sheets with 1/8 inch (3 mm) gap between sheets.
- B. Place fasteners 8 inches (152 mm) on center no closer than 3/8 inch (9.5 mm) from board edges and 2 inches (51 mm) from board corners.
- C. Boards shall be placed with a minimum 1/4 inch (6 mm) clearance from the floor surfaces and other horizontal tile termination locations, including above tub edges. This gap shall be free of adhesive and grout and filled with a flexible sealant.
- D. Boards shall be placed with a minimum 1/8 inch (3 mm) clearance from wall and cabinet bases, and other horizontal tile termination locations, including above tub edges. This gap shall be free of adhesive and grout and filled with a flexible sealant.
- E. Joints shall be reinforced with 2 inches (51 mm) wide, high-strength, coated, alkali-resistant, glass fiber reinforcing tape embedded into the wet mastic or modified thinset mortar and allowed to dry thoroughly.
- F. For large tiled areas, movement/control joints shall be provided in accordance with ANSI A108, Section AN-3.7 or as indicated on drawings.
- G. Wall tiles complying with ANSI A137.1 are attached to the board with flexible Type I mastic adhesives complying with ANSI A136.1, or acrylic or latex-modified thinset mortars complying with ANSI A118.4, in accordance with ANSI A108.

END OF SECTION

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## **SECTION 09260 - GYPSUM BOARD SYSTEMS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Gypsum wallboard and ceiling board.
  - 2. Drywall finishing.

#### **1.02 QUALITY ASSURANCE**

- A. Regulatory Requirements: Where required, provide fire-rated assemblies as listed in the following:
  - 1. Underwriters Laboratories Inc.'s (UL) "Fire Resistance Directory."

### **PART 2 - PRODUCTS**

#### **2.01 GYPSUM BOARD**

- A. Gypsum Wallboard and Ceiling Board: ASTM C 36; maximum lengths available to minimize end-to-end butt joints in each area receiving finished gypsum board.
  - 1. Edges: Tapered.
  - 2. Thickness: 5/8 inch, except as otherwise shown (fire-resistant type).
- B. Manufacturers: Products of the following manufacturers or approved equal, provided they comply with requirements of the contract documents, will be among those considered acceptable:
  - 1. Domtar Gypsum.
  - 2. Georgia-Pacific Corporation.
  - 3. Gold Bond Building Products, a National Gypsum Division.
  - 4. USG Corporation.

#### **2.02 TRIM AND ACCESSORIES**

- A. General: Except as otherwise specifically indicated, provide trim and accessories by manufacturer of gypsum board materials, made of galvanized steel or zinc alloy and configured for concealment in joint compound.

#### **2.03 JOINT TREATMENT**

- A. General: Provide products by manufacturer of gypsum boards. Comply with ASTM C 475 and with manufacturer's recommendations for specific project conditions.
- B. Joint Tape: Manufacturer's standard paper reinforcing tape.
- C. Setting Type Joint Compound: Chemical hardening type, for the following applications:
  - 1. Exterior use: Prefilling and topping.
- D. Drying Type Joint Compound: Vinyl-based type for interior use, and as follows:
  - 1. All-purpose type, for both embedding tape and as topping.

#### **2.04 MISCELLANEOUS MATERIALS**

- A. General: Provide miscellaneous materials as produced or recommended by manufacturer of gypsum products.

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## **PART 3 - EXECUTION**

### **3.01 INSTALLATION OF GYPSUM BOARD**

- A. General: Comply with ASTM C 840 and GA-216 except where exceeded by other requirements.
  - 1. Wherever possible, install gypsum board to minimize butt end joints.
  - 2. Apply ceiling boards prior to installation of wallboards. Arrange to minimize butt end joints near center of ceiling area.
  - 3. Install wallboards in a manner which will minimize butt end joints in center of wall area. Stagger vertical joints on opposite sides of walls.
- B. Installation on Metal Framing:
  - 1. Single-layer application: Install gypsum board by the following method:
    - a. Screw attachment.

### **3.02 FINISHING**

- A. General: Comply with ASTM C 840 and GA-216 except where exceeded by other requirements.
- B. Finish gypsum board in accordance with the following level of finish per GA-214, except where indicated otherwise on the drawings:
  - 1. Level 3: Embed tape in joint compound at all joints and interior angles. Provide two separate coats of compound at all joints, angles, fastener heads, and accessories. Provide smooth surfaces free of tool marks and ridges.

## **END OF SECTION 09260**

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## SECTION 09300 - TILE

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Includes:
  - 1. Porcelain wall tiles-plane.
  - 2. Porcelain wall tiles.

#### 1.02 SUBMITTALS

- A. Samples for Verification: Submit each tile type selected mounted on a minimum 12 inch square board with joints filled using selected grout.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS - GENERAL

- A. Colors, Textures, and Patterns, Tile, Grout, and Other Products: **Colors shall match the colors indicated below and as shown on drawings**, as manufactured by **manufacturers listed below**. Colors manufactured by a tile company other than that specified, must be approved as equal in color and texture by the Architect and the Roadside Unit. A manufacture other than specified shall submit an actual sample comparison submittal board with their **substitution samples** mounted alongside the specified tile samples for consideration as an equal tile product by the Architect and the Roadside Unit; the proposed substitution submittal board **shall be submitted 10 days prior to the receipt of bids to**  
**Ginger Anderson**  
**Weeks Turner Architecture**  
**319 Chapanoke Road, S. 120**  
**Raleigh, NC 27603**
  - 1. Tile trim and accessories: Match color and finish of adjoining flat tile.

#### 2.02 TILE PRODUCTS

- A. **Wall Tile:**
  - 1. The design is based on the following product:
    - a. See sheets A1.7-A1.12.
  - 2. Trim units: Match color and finish of accent/floor tile:
    - a. Shapes and sizes: Manufacturer's standard, as indicated; coordinated with indicated size and coursing of adjoining flat tile, where applicable:

#### 2.03 SETTING MATERIALS

- A. **Latex-Portland Cement Mortar:** Two-component, dry grout mix and liquid latex additive, field-mixed; complying with ANSI A118.4, for floors and walls.
  - 1. All components premeasured and prepackaged.
  - 2. Liquid latex additive: Manufacturer's standard water emulsion.
  - 3. Mix in accordance with manufacturer's recommendations.
- B. See also section 093010 Tile Setting Materials for Waterproof Membrane.

#### 2.04 GROUTING MATERIALS

- A. 100% Solids Epoxy Grout; complying with ANSI A118.3.
  - 1. Mix in accordance with manufacturer's recommendations.
  - 2. Colors: TBD
- B. Approved equals: Custom Building Products or Bonsal or Hydroment

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**2.05 SEALANTS**

- A. Compatibility: Provide elastomeric sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates for project performance conditions; color shall match wall tile grout color.
- B. Masonry / Silicone Sealant: Impregnating masonry sealer for interior and exterior manufactured stone surfaces and grout or ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and O (for nonporous substrates) with added fungicide.

**2.06 MISCELLANEOUS MATERIALS**

- A. Cementitious Backer Units: See section 09252
- B. Tile Cleaner: Product specifically acceptable to tile manufacturer and grout manufacturer for application indicated and as recommended by National Tile Promotion Federation or Ceramic Tile Institute.
- C. Stainless steel bullnose edge protection-1/4" radius (Schluter RONDEC or approved equal) Installed per manufacturers recommendations.

**PART 3 - EXECUTION****3.01 INSTALLATION - GENERAL**

- A. Tile Installation Standard: ANSI A108 series, for setting and grouting materials listed.
- B. Installation Methods: Comply with TCA "Handbook for Ceramic Tile Installation" for type of applications indicated. Tile Over Tile, TR712: Prepare existing tile floor as specified in the TCA Handbook.
- C. Cementitious Backer Units: Install in accordance with ANSI A108.11.
- D. Some materials may require extended lead times. Contractor shall be responsible for appropriate order and delivery time for custom order products.
- E. Oversized tiles will require special attention including but not limited to delivery and installation.

**3.02 TILE APPLICATIONS**

- A. Interior Wall, 1/2" Thin-Bed for large tile units:
  - 1. Tile: Glazed wall.
  - 2. Installation method:
    - a. Cementitious backer units on studs: TCA W244.
    - b. Bond coat: Latex-portland cement mortar, ANSI A108.5.
  - 1. Grout: Latex-portland cement.
- B. Tolerances: Maximum variation in floor and wall finished surface/sub-structures shall not exceed 1/8" in 10'-0" from the required tile surface plane. All individual tile edges shall align with adjacent tile edges and no greater than a 1/64" offset variation shall be acceptable.

**3.03 CLEANING AND PROTECTION**

- A. Clean tile surfaces after installation is complete.
- B. Protection: Apply neutral protective cleaner to tile after installation if recommended by tile manufacturer. Overlay completed tile installation with Kraft paper for protection from subsequent construction activities.

**3.04 MAINTENANCE**

- A. Extra Materials: At time of completing installation, deliver stock of maintenance materials to the owner. Furnish products matching those actually installed, packaged for storage and clearly labeled.
  - 1. Wall Tile: 2 percent of each variety installed and/or a minimum of 10 units of each accent color or trim units, which ever is the greatest quantity.

**END OF SECTION 09300**



## **SECTION 093010 - TILE SETTING MATERIALS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Waterproof membrane.

#### **1.2 RELATED SECTIONS**

- A. Section 093000 - Tile.

#### **1.3 REFERENCES**

- A. ANSI A136.1 - American National Standard for Organic Adhesives for Installation of Ceramic Tile.
- B. TCNA (HB) - Handbook for Ceramic Tile Installation; Tile Council of North America.
- C. ISO 13007 - International Standards Organization; classification for Grout and Adhesives.

#### **1.4 SUBMITTALS**

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Waterproof membrane Manufacturer's technical information.
- C. Installation Instructions: Manufacturer's printed instructions for each product.

#### **1.5 QUALITY ASSURANCE**

- A. Provide cleaners, sealing and maintenance products as well as tile grout, setting materials, additives, and factory-prepared dry-set mortars from the same manufacturer.

#### **1.6 DELIVERY, STORAGE AND HANDLING**

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter or other causes.
- B. Do not use frozen materials unless specifically allowed by manufacturer.
- C. Deliver and store materials on site at least 24 hours before work begins.
- D. Provide heated and dry storage facilities on site.

#### **1.7 PROJECT CONDITIONS**

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Vent temporary heaters to exterior to prevent damage to tilework from carbon dioxide build-up.
- C. Maintain temperatures at not less than 50 deg F (10 deg C) in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standards or manufacturer's written instructions.

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## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. MAPEI Americas USA,
  - 2. Laticrete
  - 3. Custom Building products

### **2.2 WATERPROOF MEMBRANE**

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Examine surfaces to receive tilework and conditions under which tile will be installed.
- B. Do not proceed with tilework until surfaces and conditions comply with requirements indicated in reference tile installation standard and manufacturer's printed instructions.

### **3.2 INSTALLATION**

- A. Install tile in accordance with manufacturer's printed instructions and the applicable requirements of ANSI A108 Series for the materials being used.
- B. Install expansion and control joints in accordance with TCNA method EJ171.
- C. Apply tile and grout cleaners, sealers and maintenance products in accordance with manufacturer's printed instructions and technical data sheets.

### **3.3 GROUTING**

- A. Grout joints in accordance with manufacturer's instructions and ANSI A108.10.
- B. Clean sanding water, dust, and foreign substances from joints to be grouted.
- C. Clean and dry tile surfaces.
- D. After grouting, remove all grout residue promptly.

### **3.4 PROTECTION**

- A. Floors: Protect from all traffic for at least 72 hours after installation.
  - 1. Do not step on floor for at least 24 hours; if traffic is unavoidable after that, use plywood stepping boards.
  - 2. Protect from heavy traffic for at least 7 days after installation.
  - 3. When fast-setting materials are used to allow faster occupancy, comply with the manufacturer's recommendations.
- B. Walls: Protect from impact, vibration and heavy hammering on adjacent and opposite walls for at least 14 days after installation, unless manufacturer's instructions allow a shorter period.
- C. Protect from food products and chemicals which can cause staining for at least 14 days.
- D. Protect from freezing and total water immersion for at least 21 days after installation.

**END OF SECTION**

## **SECTION 09900 - PAINTING**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Painting and finishing of exposed exterior items and surfaces.
  - 2. Painting and finishing of exposed interior items and surfaces.

#### **1.02 DEFINITIONS**

- A. DFM (dry film mils): Thickness, measured in mils, of a coat of paint in the cured state.

#### **1.03 SUBMITTALS**

- A. Product Data: Manufacturer's technical data sheets for each coating.
- B. Color and Texture Samples:
  - 1. Provide for each coating system, color, and texture and applied to representative substrate samples.
    - a. Prepare samples to show bare, prepared surface and each successive coat.
    - b. Label each sample with coating name and color.
  - 2. Miscellaneous substrates: 12-by-12-inch hardboard.
  - 3. Concrete: 8-inch square samples.
  - 4. Wood: 8-inch square samples for surfaces; 8-inch long samples for trim.
  - 5. Metal: 5-by-7-inch samples.

#### **1.04 QUALITY ASSURANCE**

- A. Materials: All coating materials required by this section shall be provided by a single manufacturer, unless otherwise required or approved.
- B. Applicator: Firm with successful experience in painting work similar in scope to work of this project.
  - 1. Maintain throughout duration of the work a crew of painters who are fully qualified to satisfy requirements of the specifications.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery: Deliver materials in manufacturer's original containers bearing coating name and color, material composition data, date of manufacture, legal notices if applicable, and mixing, thinning, and application instructions.

#### **1.06 PROJECT CONDITIONS**

- A. Apply coatings only under the following environmental conditions:
  - 1. Provide continuous ventilation and heating to prevent accumulation of hazardous fumes and to maintain surface and ambient temperatures above 45 degrees F for 24 hours before, during, and for 48 hours after application of finishes, or longer if required to obtain full cure as indicated by manufacturer's instructions.

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## 1.07 COORDINATION

- A. Coordination: Where special coatings will be applied over shop coatings specified in other sections, coordinate work of such other sections to ensure that only approved, compatible primers are applied.

## 1.08 MAINTENANCE STOCK

- A. At time of completing application, deliver stock of maintenance material to the owner. Furnish not less than one properly labeled and sealed 1-gallon can of each type of finish coat of each color, taken from lots furnished for the work.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. The brand-name products listed in the schedule at the end of this section and made by the following manufacturer of Low or No V.O.C. paints are the basis of the contract documents:
  - 1. **Sherwin Williams Company - Health Spec.**
- B. Products of the following manufacturers or approved equal, provided they comply with requirements of the contract documents, will be among those considered in accordance with standard substitution procedures:
  - 1. Benjamin Moore & Company - Pristine EcoSpec.
  - 2. The Glidden Company\* - Lifemaster.

### 2.02 PRODUCTS

- A. Colors:
  - 1. For multicoat systems, apply each coat using a successively darker tint or shade, unless approved otherwise.
  - 2. Top coat colors: To be determined by owner/architect.
- B. **Lead Content:**
  - 1. **Not more than 0.06 percent lead** by weight (calculated as lead metal) in the total nonvolatile content of the paint or the equivalent measure of lead in the dried film.
  - 2. Exception: Where permitted by applicable regulations.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Verify that surfaces and conditions are ready for work in accordance with coating manufacturer's recommendations.

### 3.02 SURFACE PREPARATION

- A. Apply coatings to surfaces that are clean and properly prepared in accordance with manufacturer's instructions. Remove dirt, dust, grease, oils, and foreign matter. Prepare surface for proper texture necessary to optimum coating adhesion and intended finished

appearance. Plan cleaning, preparation, and coating operations to avoid contamination of freshly coated surfaces.

1. Do not apply coatings to labels that identify equipment, fire-resistance ratings, etc.
2. Remove hardware, cover plates, and similar items before applying coatings.
3. Provide protection for non-removable items not scheduled for coating. After application of coatings, install removed items. Use only skilled workmen for removal and replacement of such items.
4. Protect surfaces not scheduled for coating. Clean, repair, or replace to the satisfaction of the Engineer any surfaces inadvertently spattered or coated.
5. Allow substrate to dry thoroughly. Test for moisture in accordance with coating manufacturer's recommendations before applying coatings.
6. Intricate fabricated shapes may be pickled in lieu of hand or power tool cleaning.
7. Before hand or power tool cleaning, remove visible oil, grease, soluble welding residue, and salts by solvent cleaning. After hand or power tool cleaning, re-clean surfaces if necessary.
8. Before touching up coatings damaged by handling or welding, re-prepare damaged surfaces.

### **3.03 MIXING AND THINNING**

- A. Remove and discard any skin formed on surface of coatings in containers. Discard any containers where skin comprises 2 percent or more of the remaining material. Do not add thinner except as specifically recommended (not merely permitted) by the coating manufacturer for proper coating application under the circumstances prevailing at the project site when application equipment recommended by the coating manufacturer is employed. Use only the quantities and the types of thinner recommended.

### **3.04 APPLICATION**

- A. General:
  1. Apply coatings in accordance with coating manufacturer's instructions and using application method best suited for obtaining full, uniform coverage of surfaces to be coated.
  2. Apply each coat to achieve the dry film thickness per coat recommended by the coating manufacturer. Application rates in excess of those recommended and fewer numbers of coats than specified will not be accepted.
  3. Completed coatings shall be free of defects such as runs, sags, variations in color, lap or brush marks, holidays, and skips.
  4. Apply coatings according to the schedule at the end of this section and as otherwise indicated. Coat all similar surfaces not specifically mentioned unless specifically exempted.
  5. Coat front and back of miscellaneous items such as covers, access panels, and grilles. Apply fully finish coats behind movable items of furniture and equipment before installation. Apply prime coat only behind non-movable items of furniture and equipment before installation.
  6. Sand gloss coats before applying subsequent coatings.
- B. Remove coatings not in compliance with this specification, re-clean and re-prepare surfaces as specified, and apply coatings to comply with the contract documents.
- C. Scheduling:
  1. Apply first coat of material to properly prepared surfaces without delay.
    - a. Apply successive coats within the time limits recommended by the manufacturer.

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### 3.05 PRIME COATS

- A. General:
  - 1. Field apply bottom coats scheduled except where the contract documents require shop coating of ferrous metals.
  - 2. Ferrous metals that have not been shop primed shall be field primed promptly after arrival at the site or shall be stored away from the effects of weather.
  - 3. Re-prepare and retouch damaged prime coats using approved, compatible primer.
- B. Primers for Wood and Wood Products:
  - 1. Apply first coat to wood upon receipt at the site and before wood is exposed to sun or rain.
  - 2. Back-prime concealed surfaces and cut edges of exterior wood trim prior to installation.

### 3.06 FINISH COATS

- A. Number of Coats and Minimum Coating Thickness:
  - 1. Apply not less than the number of coats indicated.
  - 2. Apply each coat to achieve not less than the dry film thicknesses indicated per coat.
  - 3. Apply additional coats at no additional cost to the owner when necessary to achieve complete hiding, uniform texture, or uniform sheen and appearance.

### 3.07 CLEANING AND PROTECTION

- A. Cleaning:
  - 1. Clean work area on a daily basis; dispose of spent materials and empty containers. If requested, turn over to the Engineer all empty coatings containers used during the course of each day.
  - 2. Remove all trace of coatings from adjacent surfaces not scheduled to be coated. Remove by appropriate methods that do not damage surfaces.
- B. Protection:
  - 1. Protect work against damage until fully cured. Provide signs identifying wet surfaces until surfaces are adequately cured.
  - 2. Shortly before final completion of the project, examine surfaces for damage to coatings and restore coatings to new, undamaged condition.
  - 3. Touch-up of minor damage will be acceptable where result is not visibly different from surrounding surfaces. Where result is different either in color, sheen, or texture, recoat entire surface.

### 3.08 SCHEDULE OF COATINGS FOR INTERIOR NONTRAFFIC SURFACES

- A. **Gypsum Wallboard: Walls.**
  - 1. Latex acrylic, Eggshell finish.
    - a. Bottom coat: Airless High-Build Flat Interior Primer / Finish; 1.1DFM.
    - b. Intermediate coat: Same as top coat.
    - c. Top coat: High Performance Waterborne Acrylic Eggshell Enamel (see paint schedule)
- B. **Wood: Doors & frames, windows, ceiling, trim, display cabinet, shelving.**
  - 1. Varnish, satin
    - a. Stain: Interior Oil Wood Finishing Stain, (color to be selected).
    - b. Bottom and intermediate coats: WoodPride 1908 Interior Polyurethane Gloss Varnish.
    - c. Top coat: Interior Polyurethane Satin Varnish.

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**3.09 SCHEDULE OF COATINGS FOR EXTERIOR NONTRAFFIC SURFACES**

- A. **Fiber-Cement: Lap siding & trim;**
  - 1. Acrylic / Latex, flat.
    - a. Bottom coat: Same as top coat.
    - b. Top coat: Exterior Acrylic Flat Finish; 1.5 DFM.  
(Siding & trim color shall paint over the fiber-cement see schedule)
- B. **Fiber-Cement: Vertical siding & trim;**
  - 1. Acrylic / Latex, flat.
    - a. Bottom coat: Same as top coat.
    - b. Top coat: Exterior Acrylic Flat Finish; 1.5 DFM.  
(Siding & trim color shall paint over the fiber-cement see schedule)
- C. Plywood Bead board and Batten Strips
  - a. Bottom coat: Same as top coat.
  - b. Top coat: Exterior Acrylic Flat Finish; 1.5 DFM.

**3.10 SCHEDULE OF PAINT COLORS**

SEE SHEET A1.9.

**END OF SECTION 09900**

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## **SECTION 10100 - VISUAL DISPLAY BOARDS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Tack boards, see Detail on Sheets A1.5 & A5 and Section 06200-Finish Carpentry.

#### **1.02 SUBMITTALS**

- A. Product Data:
  - 1. Manufacturer's technical data and Manufacturer's installation and breaking-in instructions.
  - 2. Submit shop drawings of Display Case with Oak frame, tack board, hardware, and glazing.

#### **1.03 PROJECT CONDITIONS**

- A. Environmental Requirements:
  - 1. Install boards only when interior air and substrates have reached equilibrium moisture and temperature approximating that of normal occupied conditions.

### **PART 2 – PRODUCTS**

#### **2.01 MATERIALS**

- A. Natural Cork Tack Boards: 4-30"x72" Display Units;
  - 1. Seamless, ¼-inch-thick cork sheet, laminated to ¼-inch-thick hardboard.
- B. Wood Trim: See Section 06200-Finish Carpentry and Section 09900-Painting for stain and varnish.
- C. Adhesives: As recommended by manufacturer for the materials and substrates to be joined.
- A. Felt Seal: ¼" wide continuous felt strip adhered to the sides and bottom face of the Display Case Cedar inner frame to seal out dust when in contact with the Display Case door in the closed position.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that substrate surfaces to receive units are true and plumb. Correct inadequate surfaces before installation of boards.
- B. Verify that moisture and temperature levels of substrate and environment have stabilized.

#### **3.02 INSTALLATION**

- A. General:
  - 1. Install off-site fabricated units as instructed by manufacturer.
  - 2. Provide any necessary installation accessories, including blocking, backing, anchors, etc.

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3. Join parts forming neatly fitted hairline joints.

### **3.03 PROTECTION**

- A. Cover completed work with building paper or other covering recommended by manufacturer.
- B. Protect boards from damage until substantial completion.

**END OF SECTION 10100**

## SECTION 10170 – PLASTIC TOILET COMPARTMENTS

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Includes:
  - 1. Water-closet compartments and urinal screens (toilet partitions).
  - 2. Restroom changing table counters and bench.

#### 1.02 SUBMITTALS

- A. Product Data.
- B. Shop Drawings.
- C. Panel Color Verification Samples: Submit 6-inch-square samples of each panel finish type and color to be installed.
- D. Manufacturer's Instructions.
- E. Maintenance Data.

#### 1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: Products and finished installations to be used by handicapped persons must comply with requirements of the 2012 NC Building Code, Chapter 11, Accessibility, and ICC A117.1.

#### 1.04 COORDINATION

- A. Use manufacturer's instructions and data to determine anchorage requirements for panel systems. In a timely manner, distribute to affected installers of related work those system components and anchorage devices provided by panel manufacturer for incorporation into other work.

### PART 2 - PRODUCTS

#### 2.01 PANEL SYSTEMS

- A. Compartments: Provide compartments fabricated of partitions and erected using the following panel systems at locations indicated on the drawings:
  - 1. Solid plastic, floor-anchored and overhead-braced.
- B. Screen Systems: Provide screens erected using the following panel systems at locations indicated on the drawings:
  - 1. Solid plastic, wall-hung, floor supported, and overhead braced.

#### 2.02 PANEL MATERIALS

- A. Plastic Solid Plastic:
  - 1. Panel material: High-density polyethylene or polypropylene, of homogeneous composition and color throughout, minimum thickness of material 1 inch. Provide seamless panels with eased edges.
  - 2. Plastic Panel; Continuous mounting brackets in matching colors;
    - a. **Bradley Partitions, color: to be determined**
    - b. Sanymetal, color to be determined.
    - c. Scranton Products.\*: "color to be determined"
  - 3. Hardware, head rails, heat-sink, shoes, and accessories. Manufacturer's standard styles. The following materials will be acceptable:
    - a. Chromium-plated nonferrous cast alloy ("Zamac").
    - b. Extruded aluminum, anodized and polished and stainless steel shoes.

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4. Manufacturers: Products of the following manufacturers or approved equal, provided they comply with requirements of the contract documents, will be among those considered acceptable (colors shall match those specified above):
  - a. Scranton Products\*: Santana/Comtec/Capitol.
  - b. The Sanymetal Products Company, Inc.
  - c. Bradley Lockers and Partitions or approved equal.

### 2.03 ACCESSORIES

- A. General: Provide hardware and accessories as necessary to properly install panel systems indicated.
  1. **Hinge:** Self-closing, continuous type helical hinge, surface-mounted; adjustable to permit door to rest at any angle or closed angle.
  2. Latch for non-handicapped compartments: Surface-mounted sliding latch type. Provide stop and keeper with rubber bumper.
  3. Latch for handicapped compartments: Surface-mounted sliding latch (for inner side of compartment doors), with emergency access feature, designed for use by handicapped persons.
  4. Provide **door pulls** on all doors, including handicapped compartments (for outer side of non-handicapped compartment doors and both sides of handicap compartments): Suitable for use by handicapped persons.
  5. Combination coat hook with rubber bumper: Provide unit of sufficient length to prevent compartment door from striking installed toilet accessories. Locate a minimum of 16" below top of door.
  6. Leveling-and-anchorage devices: Rust-resistant steel devices as recommended by panel manufacturer for installation of panels in conditions indicated.
  7. **Metal shoes:** Stainless steel. Minimum shoe height: 3 inches.
  8. Fasteners: Tamper-resistant rust-proof, exposed fasteners as recommended by panel manufacturer for installation of panels and hardware in conditions indicated. Finish to match hardware.
  9. **Overhead bracing:** Antigrip headrail bracing fabricated from continuous extruded aluminum, clear anodized finish.
  10. **Brackets:** All panels shall be mounted with continuous panel brackets of aluminum, and anchored to continuous wall blocking.
  11. **Heat-Sink:** Provide solid aluminum strips at the bottom of all panels or Class A rated panels.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Perform installation in accordance with manufacturer's instructions, except where more restrictive requirements are shown, specified, or are necessary for project conditions.

## END OF SECTION 10170

## SECTION 10425 - SIGNS

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Includes:
  - 1. Interior aluminum plaques and aluminum letters.
- B. Provide signage as indicated on the signage schedules.

#### 1.02 SUBMITTALS

- A. Product Data: Submit for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- B. Shop drawings:
  - 1. Show fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Metal Custom Room Signs: Products of the following manufacturers or approved equal, provided they comply with requirements of the contract documents, will be among those considered acceptable (colors shall match those specified):
  - 1. AOA Signs, Inc. (336) 679-3344
  - 2. Sign-A-Rama\*; (919) 773-8014
  - 3. Best Manufacturing Co.
  - 4. Accusign, Inc.; (919) 872-2008 or approved equal.

#### 2.02 RAISED LETTER SIGNS

- A. Base Material: **Aluminum plate** with brushed and polished mill finish (Sign Plaques):
  - 1. Total Thickness: ½ and 1/4 inch.
  - 2. Height: 1.5 to 7.5" inches.
  - 3. Edges: Square room title with male/female caricatures on top.
- B. Raised Character Size and Style: Routed and painted aluminum:
  - 1. Comply with applicable provisions of 2012 NC Building Code, Chapter 11, Accessibility, including International Symbol of Accessibility (restrooms, Family), and ANSI/ICC A117.1, including Tactile Characters and Braille.
  - 2. Character Color: Black
  - 3. Character Thickness: 1/32 inch minimum raised letters.
  - 4. Height: 5/8 inch minimum.
  - 5. Edges: Square.
  - 6. Character Font: Helvetica.
  - 7. Character Case: Upper case only.

#### 2.03 INDIVIDUAL METAL LETTERS

- A. Material: **Aluminum plate** with brushed mill finish:
  - 1. Thickness: 1/4 inch.
  - 2. Height: 10 inches.
  - 3. Edges: Square.
- B. Character Style:
  - 1. Character Font: Helvetica.

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2. Character Case: Upper case only and solid arrows.
3. Mount individual letters on post.

## 2.04 ACCESSORIES

- A. Mounting Hardware: Stainless steel or aluminum screws and double sided tape, permanent adhesive.
- B. Provide surface mounting for individual interior letters; 2-sets on the Beadboard panels.

## 2.05 SIGN SCHEDULE:

- A. Sign custom aluminum plaques shall read as follows:

<u>Location/Room No.</u>	<u>Copy</u>	<u>Quantity</u>
105	FAMILY ROOM**	1
105	KNOCK BEFORE ENTRY	1
106 & 108	WOMEN *	2
104 & 102	MEN *	2
103 & 107	Fire extinguisher is located inside	2
107	STORAGE	1
103	ELECTRICAL	1

- \* Provide the male or female caricature at signs noted above with aluminum figure, mount to wall 2" from the doorway or corners.
- \*\* Provide both caricatures (male & female) at signs noted above with aluminum figure, mount to wall 4" from the door opening.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. General:
  1. Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
  2. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
  3. Install project sign in locations indicated and using mounting methods indicated.
- B. Aluminum Plaques and Individual Letters:
  1. Mount plaques using the standard method recommended by the manufacturer for the type of wall surface indicated (stainless steel or aluminum screws and double sided tape).
  2. Concealed mounting: Use double-sided foam tape and mount plaques at 60" above the floor adjacent to doors 2" from the latch side of the jamb for plaques and center individual letters as indicated.

### 3.02 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

## END OF SECTION 10425

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## **SECTION 10522 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Fire extinguishers and cabinet located in rooms as shown on drawings.

#### **1.02 SUBMITTALS**

- A. Product Data.
- B. Operating and Maintenance Data.

#### **1.03 QUALITY ASSURANCE**

- A. Labels: Provide only fire extinguishers which are listed and labeled by Underwriters Laboratories Inc., or Factory Mutual System.

### **PART 2 - PRODUCTS**

#### **2.01 FIRE EXTINGUISHERS**

- A. Manufacturers: Products of the following manufacturers or approved equal, provided they comply with requirements of contract documents, will be among those considered acceptable:
  - 1. Fire extinguishers:
    - a. Amerex Corporation.
    - b. Buckeye Fire Equipment Co.
    - c. Fire-End & Croker Corporation.
    - d. General Fire Extinguisher Corporation.
    - e. Walter Kidde, The Fire Extinguisher Co.
- B. Fire Extinguishers:
  - 1. Rating: 4A:60B:C.
  - 2. Type: Multipurpose dry chemical (ammonium phosphate).
    - a. Stored pressure type.
  - 3. Cabinet mounted.

#### **2.02 CABINETS AND CABINET ACCESSORIES**

- A. Manufacturers: Products of the following manufacturers or approved equal, provided they comply with requirements of contract documents, will be among those considered acceptable:
  - 1. Cabinets and accessories:
    - a. J.L. Industries.
    - b. Larsen's Manufacturing Company.
    - c. Potter-Roemer Division/Smith Industries, Inc.
    - d. Samson Metal Products, Inc.
- B. Cabinets:
  - 1. To house one extinguisher.
  - 2. Size: Inside minimum box dimensions: 24"h. x 9"w. x 6"d.; 4" deep into wall.]
  - 3. Style: Semi-recessed mounted, protruding not more than 1-1/2 inches from face of wall.
    - a. Rolled edge trim.
  - 4. Single flat door.
    - a. Frameless acrylic.
      - 1. Clear.
    - b. Door material: Aluminum, satin anodized.

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- c. Surface mounted door handle, finished to match door.
  - d. Friction or roller catch.
- 5. Trim (box flange or frame): Aluminum, satin anodized.
  
- 6. Manufacturer's standard vertical lettering identifying contents of cabinet.
  - a. Letters silk screen painted.
  - b. Letter color: Red.
- 7. Box: Aluminum sheet.
- C. Hinges: Provide hinges for each door; concealed or continuous type; allow full 180 degree opening of door.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Prepare openings for recessed cabinets.

### **3.02 INSTALLATION**

- A. Perform installation in accordance with the manufacturer's instructions except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
- B. Install cabinets at locations indicated.
- C. Install with door handle not more than 48" above finish floor per the 2012 NC Building Code, Chapter 11, Accessibility, and ICC A117.1.

## **END OF SECTION 10522**



## SECTION 10810 - TOILET ACCESSORIES

### PART 1 - GENERAL

#### 1.01 SUMMARY

A. Section Includes:

1. Paper Towel Dispenser and waste receptacles.
2. Soap Dispenser
3. Mirrors (2-year warranty).
4. Grab bars.
5. Toilet Paper Dispenser.
6. Sanitary Napkin Disposal Units.
7. Combination utility shelf / mop and broom holders.
8. Hand Dryers.

#### 1.02 SUBMITTALS

- A. Product Data.
- B. Shop Drawings.
- C. Manufacturer's Instructions.

## PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. For each distinct type of toilet accessory, provide accessories fabricated by a single manufacturer.
- B. All model numbers specified are products of **Bobrick\* Washroom Equipment, Inc.**
- C. Only equivalent products of the following other manufacturers complying with the following **Bobrick Washroom Equipment, Inc.** provided they comply with requirements of the contract documents or approved equal, will be considered acceptable:
  1. A & J Washroom Accessories
  2. American Specialties, Inc. (ASI)

#### 2.02 TOILET ACCESSORIES

- A. Toilet Paper Dispensers:
  1. Basis of design: Model B-4288 Bobrick.
    - a. "Contour" surface-mounted twin-roll toilet tissue dispenser, holds 2-rolls up to 5-1/4" diameter, extra roll drops in place.
- B. Automatic Soap Dispenser
  1. Basis of design: Model U135EA, AJW.
- C. Grab Bar 36:
  1. Basis of design: B-6806.99 - 36".
    - a. Stainless steel, nonslip gripping surface and concealed mounting, Model B-5806.99, by Bobrick.
- D. Grab Bar 42:
  1. Basis of design: B-6806.99 - 42".
    - a. Stainless steel, nonslip gripping surface and concealed mounting, Model B-5806.99, by Bobrick.
- E. Grab Bar 18:
  1. Basis of design: B-5806.99 - 18".
    - a. Stainless steel, nonslip gripping surface and concealed mounting, Model B-5806.99, by Bobrick.
- F. Recessed Sanitary Napkin Disposal:
  1. Basis of design: ASI 0473-1.
    - a. Stainless steel.

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- b. Single end compartments.
- c.
- G. Partition Mounted Sanitary Napkin Disposal:
  - 1. Basis of design: ASI 0472-1.
    - a. Stainless steel.
    - b. Serves 2-compartments.
- H. Recessed Towel Dispenser and Waste Receptacle: 600 C-fold paper towels, 18 gallon waste capacity bottom cabinet, locking doors/cabinets, recessed flush with wall, stainless steel; no sharp edges, seamless wall flanges, concealed piano hinges.
  - 1. Product: B-43944 manufactured by Bobrick.
  - 2. LinerMate accessory to be included
- J&K. Mirrors: Stainless steel framed, ¼" thick float glass mirror (provide a 2-year warranty from mirrored glass from staining or delaminating and frame rusting); lavatory mirror with 22-gage stainless steel shelf.
  - 1. Sizes: 18' x 30" and 18" x 60".
  - 2. Frame: Radius edges, with mitered and welded and ground corners, and tamperproof hanging system; burr free satin finish.
  - 3. Product: Model B-2908 1830 and B-2908 1860 manufactured by Bobrick.
- L. Hand Dryers:
  - 1. Basis of design: Surface mounted sensor hand dryer "Xlerator" Model XL-SB, by Excel
    - a. Automatic hand dryer, stainless steel finish.
    - b. Mount 48" above finish floor.
- M. Combination Utility Shelf/Mop and Broom Holder:
  - 1. Basis of design: B-223 x 24" long.
    - a. Stainless steel with 3 mop holders.
    - b. With 3-spring loaded rubber cam mop/broom holders, Model B-223x24, by Bobrick.

## 2.03 MATERIALS

- A. Stainless steel: Type-304 stainless steel with satin finish, typical for all accessories.
- B. Mounting Devices and Fasteners: Provide toilet accessory manufacturer's recommended items for substrates and conditions indicated.

## 2.04 FABRICATION

- A. Manufacturer's Trademarks and Model Numbers: Permanently affix manufacturer's name and model number to unexposed surface of accessory.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Perform installation in accordance with manufacturer's instructions, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
- B. Accessories Installed for Use by Handicapped Persons: Install as indicated on drawings and in accordance with the 2012 NC Building Code, Chapter 11, Accessibility, and ANSI A117.1.

## END OF SECTION 10810

**DIVISION 15A - PLUMBING**

15010	Basic Plumbing Requirements
15140	Hangers and Supports
15190	Plumbing Identification
15250	Plumbing Piping Insulation
15410	Plumbing Piping
15430	Plumbing Specialties
15450	Water Heaters

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**SECTION 15010 - BASIC PLUMBING REQUIREMENTS****PART I - GENERAL**

## 1.1 GENERAL CONDITIONS

- A. The stipulations and conditions stated in this Section, together with all provisions of the "Instructions to Bidders", "General Conditions", "Supplemental General Conditions", and "Special Conditions", hereinbefore set forth, shall apply to this and the other Sections of Division 15A.

## 1.2 GENERAL REQUIREMENTS

- A. The General Requirements hereinafter listed apply to the Plumbing Work Division. If there is any conflict between the General Requirements and the General Conditions, the General Conditions shall take precedence.

## 1.3 ALTERNATES

- A. Carefully examine all alternates at the back of this specification to determine if any work described under the Plumbing Section will be affected thereby.

## 1.4 INTENT

- A. The intent of these drawings and specifications are to describe the installation of a complete, fully adjusted and operational system. Therefore, any items shown on drawings and not specifically called for in the specifications, or any items specified and not specifically indicated or detailed on the drawings, or any items neither specified or shown, but which are reasonably incidental to and commonly required to make a complete job, will be furnished and installed by the Plumbing Contractor at his own expense.

## 1.5 DEFINITIONS

- A. The Plumbing Contractor shall provide all supervision, labor, material equipment, machinery, plant, and any and all other items necessary to complete the plumbing systems. All items of equipment are specified in the singular; however, the Plumbing Contractor shall provide the number of items of equipment as indicated on the drawings, and as required for complete systems.

Where the word "provide" is used, it shall mean "furnish and install complete and ready to use".

## 1.6 VISIT TO THE SITE

The Plumbing Contractor shall visit the site before submitting his bid so as to be thoroughly familiar with the job conditions and/or peculiarities. No extra payment will be allowed for anything which could have been anticipated from a visit to the site.

## 1.7 REGULATORY REQUIREMENTS

- A. All work under this Section shall be accomplished in strict accordance with State codes. Where these plans and specifications conflict with such codes, the codes shall govern. The Plumbing Contractor shall notify the Architect or Engineer of such conflicts in writing prior to receipt of bids.

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## 1.8 PERMITS AND FEES

A. NA

## 1.9 DRAWINGS AND SPECIFICATIONS

- A. The Plumbing Drawings and Specifications are intended to cover all the work enumerated under the respective headings. The drawings are diagrammatic only. No Contractor shall take advantage of conflict or error between Drawings and Specifications, or between General Drawings and Mechanical, Plumbing and/or Electrical Drawings, but shall request a clarification of such from the Architect/Engineer, should this condition exist. If there is insufficient time to issue an Addendum for this clarification, the Plumbing Contractor shall figure on the most expensive of the items in conflict.
- B. The Plumbing Contractor shall refer to the Architectural and Structural Drawings and Specifications for the general construction of the building, for floors and ceiling heights, for locations of walls, partitions, beams, etc., and shall be guided accordingly for setting of all sleeves, inserts and equipment. The Plumbing Contractor shall not under any circumstances scale drawings for the location of equipment. The Plumbing Contractor shall verify the locations of all utility services.
- C. The Plumbing Contractor shall keep at least one set of corrected Shop and Design Drawings at the site. Drawings are to be current, denoting approved modifications and actual installed departure. Submit drawings to Architect/Engineer before final payment is made.

## 1.10 SUPERVISION

- A. The Plumbing Contractor performing the work specified shall be required to employ a qualified Superintendent or Foreman to continuously supervise the installation of their work, with authorization to act as agent. Contractors: He shall be capable of checking layouts, coordinating and supervising the work, establishing grades and levels, and locating chases, openings, hangers, inserts, sleeves, etc.

**PART II - PRODUCTS**

## 2.1 STANDARD PRODUCTS

- A. Unless otherwise indicated in writing by the Architect/Engineer, the materials to be provided under this Specification shall be standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest design. All items of the same type or rating shall be identical.

## 2.2 SUBMITTAL

- A. The Plumbing Contractor shall submit, for approval, detailed shop drawings on all major equipment and where requested. No materials or equipment may be delivered to the job site or installed until the Plumbing Contractor has in his possession the approved shop drawing for the particular material or equipment. The Plumbing Contractor shall furnish the number of copies required by the General or Special Conditions of the contract, but no case less than six (6) copies.
- B. Submitted material shall be properly labeled indicating specific service for which material or equipment to be used, section and article number of specifications governing, Contractor's name and name of job.

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- C. Approval of equipment will not relieve the Plumbing Contractor of compliance with the Specifications even if such approval is made in writing, unless the attention of the Engineer is called to the non-complying features by letter accompanying the submittal data. Approval of Submittal Data by the Engineer shall not be construed as a complete check of approval of detailed dimensions, weights, gauges, and similar details with the proposed articles. The conformance with the necessary coordination between the various other Contractors and suppliers shall be solely the responsibility of the Plumbing Contractor and with no additional expense to the Owner.

### 2.3 SUBSTITUTIONS

- A. Manufacturer's lists are to establish a standard of quality and not intended to limit the selection to these manufacturers. All materials and equipment which are essential and have not been specified or shown, shall be new and of the highest grade and quality and free from defect or other imperfections. It should be understood that where the words "furnished and installed" are used, it is intended that the Plumbing Contractor shall purchase and install all materials required.
- B. All materials and equipment proposed as substitutes for these specified shall require a ten (10) day prior approval from the Engineer prior to the bid date. No substitutions will be allowed after the ten (10) day period before the bid date.

### 2.4 PRODUCT HANDLING

- A. Equipment and materials shall be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored and protected in accordance with the manufacturer's recommendations and as approved by the Architect/Engineer. Equipment installed with a factory finish shall be fully protected during construction and shall be maintained free of dust, dirt, and foreign matter. Dents and other surface damage shall be repaired or replaced to the satisfaction of the Architect/Engineer at no additional cost to the Owner.
- B. The Plumbing Contractor shall clean up and remove from the job site all waste materials, packaging, crating, and refuse resulting from his work on a daily basis.

### 2.5 MATERIALS AND WORKMANSHIP

- A. The Plumbing Contractor shall perform a first class job, both in material and workmanship. None other will be accepted. Deviations from either will be corrected by the Plumbing Contractor at the Plumbing Contractor's expense.
- B. The material used throughout the work, except when otherwise noted, shall be new and of the best of its kind. No substitutes shall be used unless approved by the Architect/Engineer. All work shall be executed with a maximum speed consistent with safety and good workmanship.
- C. Any equipment furnished by the Plumbing Contractor that is larger than those indicated on the drawings and described in these Specifications or have different electrical characteristics, the increase in cost to the Electrical Contractor for larger wires, conduit, circuit breakers, switches, etc. or for changes in work already installed shall be borne by the instigating Contractor.

## PART III - EXECUTION

### 3.1 EXCAVATION AND BACKFILL

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- A. The Plumbing Contractor shall preform any and all trench and pit excavation and backfilling required for the installation of his work. Trenches shall be made with the sides vertical and shall be shored where necessary for the protection of men and equipment. All excavation work shall be done in a careful manner to avoid damage to footers and foundations. The backfilling shall be placed in layers not exceeding 4 inches in depth, wetting each layer as it is placed, and thoroughly compacting each layer with mechanical tamper or other approved means. Any damage done during excavation and backfilling operations to roads, sidewalks, curbs, shrubs, sod, footers, foundations, etc. shall be replaced to its condition prior to construction at no expense to the Owner.

### 3.2 SCAFFOLDING, RIGGING AND HOISTING

- A. The Plumbing Contractor shall furnish all necessary scaffolding, staging, rigging and hoisting required for the completion of his work. All such scaffolding, etc., shall be removed from the premises when its use is no longer required on the job.

### 3.3 CUTTING AND PATCHING

- A. The Plumbing Contractor shall provide all cutting and patching necessary to install the work specified in this section. The patching shall match adjacent surfaces.
- B. No structural member shall be cut without the approval of the Engineer, and all such cutting shall be done in a manner directed by him.

### 3.4 EQUIPMENT SPACE AND ARRANGEMENT

- A. The equipment shall fit into the space allotted and shall allow adequate clearance for entry, installation, replacement, servicing, and maintenance. The Plumbing Contractor shall coordinate the work to ensure that equipment may be moved into place without altering building components or other installations. Access space shall not be less than the equipment manufacturer's requirements.
- B. These drawings indicate the extent and general arrangement of equipment, piping, and ductwork. If any departures are deemed necessary by the Plumbing Contractor, details of such departures and the reasons therefore shall be submitted to the Architect/Engineer for approval as soon as practicable and within 30 days after award of the contract. No departure shall be made without written approval of the Architect/Engineer.

### 3.5 DAMAGE TO WORK ALREADY IN PLACE

- A. The Plumbing Contractor shall assume full responsibility for any damage done by him, his agents or employees, to any work already in place. Any such damage done shall be repaired at the Contractor's expense by mechanics skilled at their respective trades to the approval of the Architect/Engineer.

### 3.6 JURISDICTION OF WORK

- A. It may become necessary for the Plumbing Contractor to furnish labor or materials which is not generally accepted as part of this trade. In cases of this type, he shall contract the work or shall furnish materials and employ workmen of the trade involved in order not to cause any delay or stoppage of work caused by infringement of trade agreements as to jurisdiction, alleged or actual.

### 3.7 COORDINATION WITH OTHER TRADES

- A. All work shall be coordinated with other trades involved in the construction project. All work shall be carefully laid out in advance to coordinate Architectural, Structural, Mechanical, Plumbing and Electrical features of construction. The Plumbing Contractor

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shall verify at the site all locations, grades, elevations, and utility service connections indicated. Any conflicts due to lack of proper coordination shall be brought to the attention of the Architect/Engineer for resolution. The Plumbing Contractor shall make required changes or relocations at no additional cost to the Owner.

- B. Installation, inspection, and testing of work above ceilings shall be completed and approved by the Architect/Engineer prior to installation of the specified finished ceilings. However, ceiling suspension system may be installed as required for coordination.
- C. The Plumbing Contractor shall consult with the other trades at the start of the work and periodically thereafter, as required to properly coordinate the various items of work, and to avoid interferences. Should any interferences of any nature develop as the work progresses, such interferences shall be resolved and eliminated as directed. The cost of any work directed shall be borne by the Subcontractor or Contractors directed to do this work.

### 3.8 DIVISION OF WORK

- A. This paragraph is intended to show exactly the point of division of work between the Electrical Division and the Plumbing Division.
- B. All equipment covered in the Plumbing Division of the specifications shall be furnished, mounted, and aligned under the Plumbing Division. All individual motor starters, unless indicated as part of a motor control center, for this equipment shall be furnished and installed by the Plumbing Contractor.
- C. All final electrical connections to equipment covered in the Plumbing Division of the specifications shall be completed under the Plumbing Division.
- D. The Electrical Contractor shall provide a disconnect switch or junction box for each item of equipment under Division 16.
- E. Electrical equipment and wiring that is provided by the Plumbing Contractor shall be in accordance with the Electrical specification.

### 3.9 EQUIPMENT INSTALLATION

- A. Final connections to equipment, including pipe, duct, and controls, shall be provided under applicable sections of this Division, unless otherwise specified or indicated.
- B. Manufacturer's Instructions: Equipment shall be installed as recommended by the manufacturer to conform to the requirements of the particular application, in accordance with these drawings and specifications.

### 3.10 OPERATION AND MAINTENANCE MANUALS

- A. One complete manual as outlined herein shall be submitted for approval before conducting instruction sessions in operation, before systems or equipment tests are performed, and before final or beneficial occupancy.
- B. Manuals shall have rigid covers and index tabs for each major piece of equipment, auxiliaries, and systems. The following shall be inscribed on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the building, the name of the Section, such as "Plumbing" and the name of the Plumbing Contractor. Two copies of each approved manual shall be submitted to the Owner and one copy shall be submitted to the Architect/Engineer.



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- C. Each piece of equipment shall be listed and identified with the same name, mark, number, or other identification as noted or scheduled in the Contract Documents.
- D. Manuals shall include the following:
  - 1. Complete operating installations, covering start-up and shutdown for all components installed.
  - 2. Legible copies of all shop drawings. Any comments incorporated in "as noted" approvals of shop drawings shall be recorded on the drawings included in the manuals.
  - 3. All equipment Maintenance and Service Manuals.
- E. A complete parts list for each piece of equipment.
- F. All descriptive literature for the equipment.
- G. Operating characteristics, performance data, ratings, and curves for each piece of equipment.
- H. Internal wiring and control diagrams.
- I. All other information pertinent to the maintenance and servicing of equipment and systems provided in the project.
- J. Name, address, and telephone number for service on each manufacturer's equipment.

### 3.11 OPERATING INSTRUCTIONS

- A. After all equipment and services are in operation, and the Operation and Maintenance Manuals are available, an instruction and training session shall be conducted for the Owner's operating personnel.
- B. Instruction sessions shall be conducted during the Owner's normal working periods, and at times and locations satisfactory to the Owner.

### 3.12 EQUIPMENT START-UP

- A. No equipment shall be placed in operation until it has been inspected by a qualified representative of the manufacturer and Certified to be ready for operation. The manufacturer's representative shall supervise the start-up operation and shall be responsible for all adjustments required to meet design conditions. Such services shall be at no additional cost to the Owner.

### 3.13 GUARANTEE

- A. The Plumbing Contractor shall present to the Owner a written guarantee covering his work, including all equipment, material and workmanship. This guarantee shall be against all defects in any of the above work, and shall run for a period of one (1) year from the date of written acceptance of the Contractor's work.
- B. Any defective work, equipment, material and/or workmanship that develops within the guarantee period, which is not caused by ordinary wear or abuse by other persons, shall be replaced by the Plumbing Contractor without cost to the Owner.

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## 3.14 FINAL INSPECTION

- A. When the entire Contract has been completed and the work is ready for final inspection, the Architect/Engineer or his duly authorized representative will make the inspection. At the time of inspection, the Plumbing Contractor shall demonstrate to the Architect/Engineer that the various systems and pieces of equipment have been adjusted to operate in accordance with the requirements of the Contract.

## 3.15 FINAL PAYMENTS

- A. All final payments are contingent upon all necessary Certificates and/or Approvals cited above, together with the written Guarantee being presented to the Owner.

END OF SECTION 15010

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**SECTION 15140 - HANGERS AND SUPPORTS****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawing and General Provisions of the Contract, including the General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Hangers and Supports for Plumbing Systems Piping and Equipment.

**PART II - PRODUCTS**

## 2.1 PIPE HANGERS AND SUPPORTS

- A. Hangers: Galvanized carbon steel, adjustable, clevis
- B. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- C. Vertical Support: Steel riser clamp
- D. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- E. Shield for Insulated Piping 2 Inches and Smaller: 18 gauge galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.
- F. Sheet metal saddles must be  $\frac{1}{2}$  the circumference of the insulation, turned up or rounded at the corners to avoid damage to the vapor barrier.

## 2.2 HANGER RODS

- A. Galvanized Steel Hanger Rods: Threaded both ends or continuous threaded.

## 2.3 FLASHING

- A. Metal Flashing: 26 gauge galvanized steel
  - B. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.
  - C. Flashing shall be compatible with the roofing material and be coordinated with the Contractor.
- General

## 2.4 SLEEVES

- A. Sleeves for Pipes: Form with schedule 40, galvanized steel pipe
- B. Fire Stopping Insulation: Glass fiber type, non-combustible
- C. Caulk: Fire Barrier type sealant

## 2.5 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized

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- B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts
- C. Washers: ASTM F 844, steel, plain, flat washers
- D. Grout: ASTM C 1107, Grade B, non-shrink, non-metallic
  - 1. Characteristics include post-hardening, volume-adjusting, dry, hydraulic cement-type grout that is non-staining, non-corrosive, non-gaseous and is recommended for both interior and exterior applications.
  - 2. Design Mix: 5000-psi (34.5MPa), 28-day compressive strength
  - 3. Water: Potable
  - 4. Packaging: Pre-mixed and factory-packaged

## 2.6 ATTACHMENTS

- A. Mechanical Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Permitted in concrete over four (4) inches thick.
- B. Weld: Type 22
- C. Beam clamps: Types 20, 21, 28 or 29
- D. Wood: Wood screws or lag bolts

## PART III - EXECUTION

### 3.1 HANGERS AND SUPPORTS INSTALLATION

- A. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Install building attachments within concrete or to structural steel. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping.
- C. Install hangers and support complete with necessary inserts, bolts, rods, nuts, washers and other accessories.
- D. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends and similar units.
- E. Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

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F. Support horizontal piping as follows:

<u>PIPE SIZE</u>	<u>HANGER SPACING</u>	<u>MAXIMUM DIAMETER</u>
1/2 to 1-1/4 inch	6'-6"	3/8"
1-1/2 to 2 inch	10'-0"	3/8"
2-1/2 to 3 inch	10'-0"	1/2"
4 to 6 inch	10'-0"	5/8"
Waste Pipe	5'-0"	3/8"

- G. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work
- H. Place a hanger within 12 inches of each horizontal elbow.
- I. Use hangers with 1 1/2 inch minimum vertical adjustment
- J. Support riser piping independently of connected horizontal piping.
- K. Hangers shall be galvanized steel or copper.

### 3.5 FLASHING

- A. Provide flashing and counter-flashing where piping penetrates weather-proofed walls, floors and roofs.
- B. Flash vent and soil pipes projecting six (6) inches minimum above finished roof surface with lead worked one (1) inch minimum into hub. For pipes through outside walls, turn flanges back into wall and caulk, metal counter-flash and seal.

### 3.6 SLEEVES

- A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- B. Design hangers without disengagement of supported pipe
- C. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with fire stopping insulation and caulk seal air-tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- D. Install chrome plated steel or stainless steel escutcheons at finished surfaces.
- E. Pipe strapping will not be allowed.

END OF SECTION 15140

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**SECTION 15190 - PLUMBING IDENTIFICATION****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes plumbing identification materials and devices.

## 1.3 QUALITY ASSURANCE

- A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

## 1.4 SEQUENCING AND SCHEDULING

- A. Coordinate installation of identifying devices after completion of covering and painting where devices are applied to surfaces. Install identifying devices prior to installation of acoustical ceilings and similar concealment.

**PART II - PRODUCTS**

## 2.1 MATERIALS

- A. Color: Unless specified otherwise, conform with ANSI/ASME A13.1.
  - 1. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.
  - 2. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1½ inch diameter.
  - 3. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
  - 4. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape of not less than 6 inch wide by 4 mil thick, manufactured for direct burial service.

**PART III - EXECUTION**

## 3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

## 3.2 INSTALLATION

- A. Plastic Nameplates: Install with corrosive-resistant mechanical fasteners.
- B. Plastic Tags: Install with corrosive-resistant chain.

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- C. Plastic Tape Pipe Markers: Install complete around pipe in accordance with the manufacturer's instructions
- D. Underground Plastic Pipe Markers: Install 6 to 8 inches below finished grade, directly above the buried pipe.
- E. Equipment: Identify pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with plastic tags
- F. Controls: Identify control panels and major control components outside panels with plastic nameplates.
- G. Piping: Identify piping, concealed or exposed, with plastic tape pipe markers. Tags may be used on small diameter piping. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION 15190

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**SECTION 15250 - PLUMBING PIPING INSULATION****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Plumbing Pipe Insulation.

## 1.3 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.

- 1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.

## 1.4 SEQUENCING AND SCHEDULING

- A. Schedule insulation application after testing of piping systems.
- B. Schedule insulation application after installation and testing of heat trace tape.

**PART II - PRODUCTS**

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Glass Fiber:
    - a. Certain Teed Corporation
    - b. Knauf Fiberglass GmbH
    - c. Manville
    - d. Owens-Corning Fiberglas Corporation
    - e. USG Interiors, Inc. - Thermafiber Division

## 2.2 GLASS FIBER

- A. Material: Inorganic glass fibers, bonded with a thermosetting resin. Jacket: All purpose, factory applied, laminated glass fiber- reinforced, flame retardant Kraft paper and aluminum foil having self-sealing lap.
- B. Preformed Pipe Insulation: ASTM C 547, Class 1, rigid pipe insulation, jacketed.
  - 1. Thermal Conductivity: 0.26 average maximum at 75 degrees F mean temperature.
  - 2. Density: 10 average maximum.
- C. Adhesive: Produced under the UL Classification and Follow-up Service.



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1. Type: Non-flammable, solvent-based.
2. Service Temperature Range: Minus 20 degrees to 180 degrees F.

## 2.3 INSULATING CEMENTS

## A. Mineral Fiber, Hydraulic-Setting Insulating and Finishing Cement: ASTM C 449

1. Thermal Conductivity: 1.2 average maximum at 400 degrees F mean temperature.
2. Compressive Strength: 100 psi at 5 percent deformation.

## 2.4 ADHESIVES

## A. Lagging Adhesive: MIL-A-3316C, non-flammable adhesive in the following Classes and Grades.

1. Class 1, Grade A for bonding glass cloth and tape to un-faced glass fiber insulation, sealing edges of glass fiber insulation, and bonding lagging cloth to un-faced glass fiber insulation.
2. Class 2, Grade A for bonding glass fiber insulation to metal surfaces.

## 2.5 JACKETS

## A. PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil thick, high impact, ultra-violet resistant PVC.

1. Adhesive: As recommended by insulation manufacturer.

## 2.6 SEALING COMPOUNDS

## A. Vapor Barrier Compound: Water-based, fire-resistive composition

1. Water Vapor Permeance: 0.08 perm maximum
2. Temperature Range: Minus 20 degrees to 180 degrees F

**PART III - EXECUTION**

## 3.1 PREPARATION

## A. Surface Preparation: Clean, dry, and remove foreign materials such as rust, scale, and dirt.

## 3.2 INSTALLATION - GENERAL

- A. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.
- B. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.
- C. Keep insulation materials dry during application and finishing.

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- D. Apply insulation continuously over fittings, valves and specialties.
- E. Apply insulation with a minimum number of joints.
- F. Apply insulation with integral jackets as follows:
  - 1. Pull jacket tight and smooth.
  - 2. Cover circumferential joints with butt strips, at least three (3) inches wide, and of same material as insulation jacket. Secure with adhesive and outward clinching staples along both edges of butt strip and space 4 inches on center.
  - 3. Longitudinal Seams: Overlap seams at least 1½ inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at four (4) inches on center.
  - 4. Vapor Barrier Coatings: Apply on seams and joints, over staples, and at ends butt to flanges, unions, valves, and fittings.
  - 5. At penetrations in jackets for thermometers and pressure gauges, fill and seal voids with vapor barrier coating.
  - 6. Repair damaged insulation jackets, except metal jackets, by applying jacket material around damaged jacket. Adhere, staple, and seal. Extend patch at least 2 inches in both directions beyond damaged insulation jacket and around the entire circumference of the pipe.
- G. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire rated walls and partitions.
- H. Flanges, Fittings, and Valves: Apply pre-molded, pre-cut, or field fabricated segments of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.
  - 1. Use same material and thickness as adjacent pipe insulation.
  - 2. Overlap nesting insulation by 2 inches or 1 pipe diameter, whichever is greater.
  - 3. Apply materials with adhesive, fill voids with mineral fiber insulating cement. Secure with wire or tape.
  - 4. Insulate elbows and tees smaller than three (3) inches pipe size with pre-molded insulation.
  - 5. Insulate elbows and tees Three (3) inches and larger with pre-molded insulation or insulation material segments. Use at least three (3) segments for each elbow.
  - 6. Cover insulation, except for metal jacketed insulation, with PVC fitting covers and seal circumferential joints with butt strips.
- J. Hangers and Anchors: Apply insulation continuously through hangers and around anchor attachments. Install saddles, shields, and inserts as specified.
  - 1. Inserts and Shields: Cover hanger inserts and shields with jacket material matching adjacent pipe insulation.

### 3.3 GLASS FIBER INSULATION INSTALLATION

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- A. Bond insulation to pipe with lagging adhesive.
- B. Seal exposed ends with lagging adhesive.
- C. Seal seams and joints with vapor barrier compound.

## 3.7 PIPE INSULATION SCHEDULES

<b><u>PIPING</u></b>	<b><u>INSULATION TYPE</u></b>	<b><u>THICKNESS IN INCHES</u></b>
Domestic Hot Water Supply	GLASS FIBER	1
Domestic Hot Water Re-Circulating	GLASS FIBER	1
Domestic Cold Water (INTERIOR)	GLASS FIBER	1/2
"P" Trap at Handicapped Fixtures	PREFORMED ELASTOMERIC INSULATION PACKAGE WITH VINYL COVER	1/2

END OF SECTION 15250

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**SECTION 15410 - PLUMBING PIPING****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes plumbing piping systems to a point shown on the civil drawings. Systems include the following:
1. Potable water distribution, including cold and hot water supply and hot water circulation.
  2. Sanitary Drainage and Vent Systems.

## 1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working pressure ratings, except where indicated otherwise:
1. Water Distribution Systems, Below Ground: 150 psig.
  2. Water Distribution Systems, Above Ground: 125 psig.
  3. Soil, Waste and Vent Systems: 10-foot head of water

**PART II - PRODUCTS**

## 2.1 SANITARY SEWER PIPING - BURIED

- A. Sch. 40 PVC Pipe: ASTM D2665. Fittings: PVC. Joints: ASTM D2564, solvent weld.

## 2.2 SANITARY SEWER PIPING - ABOVE GRADE

- A. Sch. 40 PVC Pipe: ASTM D2665. Fittings: PVC. Joints: ASTM D2564, solvent weld.

## 2.3 WATER PIPING - BURIED

- A. Copper Tubing: ASTM B88, Type K, annealed. Fittings; ANSI/ASME B16.29, wrought copper. Joints: ANSI/ASTM B32, solder, Grade 95TA.

## 2.4 WATER PIPING - ABOVE GRADE

- A. Copper Tubing: ASTM B88, Type L, hard drawn. Fittings: ANSI/ASME B16.23, cast brass, or ANSI/ASME B16.29, wrought copper. Joints: ANSI/ASTM B32, solder, Grade 95TA.

## 2.5 MANUFACTURERS

- A. Acceptable Manufacturers-Valves:
1. Crane
  2. Grinnell

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3. Nibco

4. Apollo

## 2.6 GATE VALVES

A. 150 psig rated, bronze body, lever ball type, Apollo or equal.

**PART III - EXECUTION**

## 3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

## 3.2 INSTALLATION

A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

B. Route piping in orderly manner and maintain gradient.

C. Install piping to conserve building space and not interfere with use of space.

D. Group piping whenever practical at common elevations.

E. Install piping to allow for expansion and contraction without stressing pipes, joints, or connected equipment.

F. Provide clearance for installation of insulation and access to valves and fittings.

G. Slope water piping and arrange to drain at low points.

H. Establish elevations of buried piping outside the building to ensure not less than 1 ft of cover.

I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

J. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting.

K. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients.

L. Excavate in accordance with Sections 15010.

M. Backfill in accordance with Sections 15010.

N. Install bell and spigot pipe with bell end upstream.

**O. Copper piping 2" and larger shall be silver-soldered.**

P. Install valves with stems upright or horizontal, not inverted.

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### 3.3 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- C. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install globe or ball valves for throttling, bypass, or manual flow control services.

### 3.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Inject disinfectant solution containing 100 ppm of available chlorine and allow to stand for 2 hours before flushing.
- C. Flush disinfectant from system until residual is equal to that of incoming water or 1.0 mg/L.
- E. Take samples from outlets and analyze in accordance with AWWA C601. Contractor shall engage an independent laboratory to conduct bacteriological and post chlorination tests certifying that the water meets the quality of drinking water. After acceptance by the Engineer of Record, "The Water Test Report for Use" is required to be submitted to SCO prior to requesting the Occupancy Permit.

### 3.5 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

END OF SECTION 15410

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**SECTION 15430 - PLUMBING SPECIALTIES****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Plumbing Specialties for water distribution systems; and soil, waste and vent systems.

## 1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Submit product data including rated capacities of selected models and weights (shipping, installation, and operation). Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections.

**PART II - PRODUCTS**

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Backflow Preventers:
    - a. Ames Co., Inc.
    - b. Hersey Products, Inc., Grinnell Corp.
    - c. Watts Regulator Co.
    - d. Wilkins Regulator Div., Zurn Industries, Inc.
  - 2. Water Pressure Regulators:
    - a. Spence Engineering Co., Inc.
    - b. Watts Regulator Co.
    - c. Wilkins Regulator Div., Zurn Industries, Inc.
  - 3. Specialties:
    - a. Josam Co.
    - b. Smith by Jay R. Smith Mfg. Co. Div., Smith Industries, Inc.
    - c. Watts Regulator Co.
    - d. Woodford Manufacturing Co. Div., WCM Industries, Inc.
    - e. Zurn by Hydromechanics Div., Zurn Industries, Inc.

## 2.2 CLEANOUTS

- A. Exterior Surfaced Areas: Round cast nickel-bronze access frame and non-skid cover.
- B. Exterior Un-Surfaced Areas: Line type with lacquered cast iron body and round epoxy coated gasketed cover.

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- C. Interior Finished Floor Areas: Lacquered cast iron, two piece body, round with scoriated cover in service areas and round with depressed cover to accept floor finish in finished floor areas.
- D. Interior Finished Wall Areas: Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

### 2.3 WATER HAMMER ARRESTORS

- A. ANSI A112.26.1; sized in accordance with PDI WH-201, pre-charged suitable for operation in temperature range -100 to 300 degrees F and maximum 250 psig working pressure.

### 2.4 TRAP SEAL PRIMER VALVE:

- A. ASSE 1018; water supply fed type, fully automatic 125psig minimum working pressure, Bronze body with atmospheric vented drain chamber, ½ inch threaded or solder joint inlet and outlet connections, Chrome plated, or rough bronze finish. Unit shall be capable of being located on any active water line.

### 2.5 BACKFLOW PREVENTERS

- A. Reduced Pressure Back-flow Preventers: ANSI/ASSE 1013; bronze body with bronze and plastic internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve which opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

## PART III - EXECUTION

### 3.1 PREPARATION

- A. Coordinate construction areas to receive drains to the required invert elevations.

### 3.2 INSTALLATION AND APPLICATION

- A. Install specialties in accordance with manufacturer's instructions to permit intended performance.
- B. Extend clean-outs to finished floor. Lubricate threaded clean-out plugs Teflon pipe dope. Ensure clearance at clean-out for rodding of drainage system.
- C. Encase exterior clean-outs in concrete flush with grade.
- D. Install water hammer arrestors complete with accessible isolation valve.

END OF SECTION 15430



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**SECTION 15450 - WATER HEATERS****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Electric Water Heaters and In-Line Circulators.

## 1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data including rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties, and accessories, and indicating dimensions, required clearances, and methods of assembly of components, and piping and wiring connections.

**PART II - PRODUCTS**

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Water Heaters:
    - (a) Bradford-White Corp.
    - (b) A.O. Smith Water Products Co. Div.
    - (c) State Industries, Inc.
    - (d) Ruud

## 2.5 COMMERCIAL ELECTRIC WATER HEATERS

- A. Factory assembled and wired, electric, [vertical] [horizontal] storage type, 150 psig maximum working pressure.
- B. Glass lined welded steel tank; four (4) inch diameter inspection port, thermally insulated with minimum two (2) inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.
- C. Brass water connections and dip tube, drain valve, high-density magnesium anode, and ASME rated temperature and pressure relief valve.
- D. Flange-mounted immersion heating electrical elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 75 Watts per square inch.

## 2.6 IN-LINE CIRCULATOR PUMPS

- A. Casing: Bronze, rated for 125 psig working pressure
- B. Impeller: Bronze

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- C. Shaft: Alloy steel with integral thrust collar and two (2) oil lubricated bronze sleeve bearings.
- D. Seal: Carbon rotating against a stationary ceramic seat.
- E. Drive: Flexible coupling

## 2.7 THERMAL EXPANSION TANKS

- A. Construction: Welded steel, tested and stamped in accordance with Section 8D of ANSI/ASME Code; supplied with National Board Form U-1, rated for working pressure of 125 psig, maximum operating temperature 210 degrees F., with flexible EPDM diaphragm sealed into tank.
- B. Accessories: Pressure gage and air-charging fitting, tank drain; pre-charge to 55 psig.
- C. Size: 10.5" diameter, 16" overall length, 5 gallon capacity.

## PART III - EXECUTION

### 3.1 WATER HEATER INSTALLATION

- A. Install water heaters in accordance with manufacturer's instructions and to UL requirements.
- B. Coordinate with plumbing piping and related [fuel piping] [gas venting] [electrical] work to achieve operating system.

### 3.2 PUMP INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide air cock and drain connection on horizontal pump casings.
- C. Decrease from line size, with long radius reducing elbows or reducers. Support piping adjacent to pump such as that no weight is carried on pump casings.

Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

END OF SECTION 15450

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**DIVISION 15B: MECHANICAL**

15500	Basic Mechanical Requirements
15501	Hangers and Supports
15504	Piping Insulation-Refrigerant and Condensate
15507	Ductwork Insulation
15513	Refrigerant Piping
15672	Split System Heat Pump
15674	Duct Free Split System Air Conditioner
15782	Energy Recovery Ventilator
15870A	Power Ventilators
15891A	Metal Ductwork
15910	Duct Accessories
15932	Air Outlets and Inlets
15990	Testing, Adjusting and Balancing

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**SECTION 15500 BASIC MECHANICAL REQUIREMENTS****PART I - GENERAL**

## 1.1 GENERAL CONDITIONS

- A. The Stipulations and Conditions stated in this Section, together with all provisions of the "Instructions to Bidders", "General Conditions", "Supplemental General Conditions", and "Special Conditions", herein before set forth, shall apply to this and the other Sections of Division 15.

## 1.2 GENERAL REQUIREMENTS

- A. The General Requirements hereinafter listed apply to the Mechanical Work Division. If there is any conflict between the General Requirements and the General Conditions, the General Conditions shall take precedence.

## 1.3 ALTERNATES

- A. Carefully examine all Alternates at the back of this Specification to determine if any work described under the Mechanical Section will be affected thereby.

## 1.4 INTENT

- A. The intent of these Drawings and Specifications are to describe the installation of a complete, fully adjusted, and operational system. Therefore, any items shown on Drawings and not specifically called for in the Specifications, or any items specified and not specifically indicated or detailed on the Drawings, or any items neither specified or shown, but which are reasonably incidental to and commonly required to make a complete job, will be furnished and installed by the Mechanical Contractor at his own expense.

## 1.5 DEFINITIONS

- A. The Mechanical Contractor shall provide all supervision, labor, material equipment, machinery, plant, and any and all other items necessary to complete the mechanical systems. All items of equipment are specified in the singular; however, the Mechanical Contractor shall provide the number of items of equipment as indicated on the Drawings, and as required for complete systems.

Where the word "provide" is used, it shall mean "furnish and install complete and ready to use".

## 1.6 VISIT TO THE SITE

- A. The Mechanical Contractor shall visit the site before submitting his bid, so as to be thoroughly familiar with the job conditions and/or peculiarities. No extra payment will be allowed for anything that could have been anticipated from a visit to the site.

## 1.7 REGULATORY REQUIREMENTS

- A. All work under this Section shall be accomplished in strict accordance with State codes. Where these Plans and Specifications conflict with such codes, the codes shall govern. The Mechanical Contractor shall notify the Architect or Engineer of such conflicts in writing prior to receipt of bids.

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**1.8 PERMITS AND FEES**

- A. The Mechanical Contractor shall make all necessary arrangements, obtain all necessary approval, obtain all permits and pay fees required for the installation of any of the work covered under the Mechanical Work Division of the Specifications. Any fees required by any utility companies or municipal authorities for the final connections for these services shall be paid by the Mechanical Contractor under whose work such services appear. Before the job is certified as substantially complete, a Certificate of Approval from all authorities involved must be obtained and turned over to the Architect/Engineer.

**1.9 DRAWINGS AND SPECIFICATIONS**

- A. The Mechanical Drawings and Specifications are intended to cover all the work enumerated under the respective headings. The drawings are diagrammatic only. No Contractor shall take advantage of conflict or error between Drawings and Specifications, or between general Drawings and Mechanical, Plumbing and/or Electrical Drawings, but shall request a clarification of such from the Architect/Engineer, should this condition exist. If there is insufficient time to issue an Addendum for this clarification, the Mechanical Contractor shall figure on the most expensive of the items in conflict.
- B. The Mechanical Contractor shall refer to the Architectural and Structural Drawings and Specifications for the general construction of the building, for floors and ceiling heights, for locations of walls, partitions, beams, etc., and shall be guided accordingly for setting of all sleeves, inserts and equipment. No Contractor shall under any circumstances scale Drawings for the location of equipment. The Mechanical Contractor shall verify the locations of all utility services.
- C. The Mechanical Contractor shall keep at least one (1) set of corrected Shop and Design Drawings at the site. Drawings are to be current, denoting approved modifications and actual installed departure. Submit drawings to Architect/Engineer before final payment is made.

**1.10 SUPERVISION**

- A. The Mechanical Contractor performing the work specified shall be required to employ a qualified superintendent or foreman to continuously supervise the installation of their work, with authorization to act as agent Contractors. He shall be capable of checking layouts, coordinating and supervising the work, establishing grades and levels and locating chases, openings, hangers, inserts, sleeves, etc.

**PART II - PRODUCTS****2.1 STANDARD PRODUCTS**

- A. Unless otherwise indicated in writing by the Architect/Engineer, the materials to be provided under this Specification shall be standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest design. All items of the same type or rating shall be identical.

**2.2 SUBMITTAL**

- A. The Mechanical Contractor shall submit, for approval, detailed Shop Drawings on all major equipment and where requested. No materials or equipment may be delivered to the job site or installed until the Mechanical Contractor has in his possession the approved shop drawing for the particular material or equipment. The Mechanical Contractor shall furnish the number of copies required by the General or Special

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- Conditions of the contract, but in no case less than six (6) copies.
- B. Submitted material shall be properly labeled indicating specific Service for which material or equipment to be used, Section and Article Number of Specifications governing, Contractor's name and name of job.
  - C. Approval of equipment will not relieve the Mechanical Contractor of compliance with the specifications even if such approval is made in writing, unless the attention of the Engineer is called to the non-complying features by letter accompanying the submittal data. Approval of submittal data by the Engineer shall not be construed as a complete check of approval of detailed dimensions, weights, gauges and similar details with the proposed articles. The conformance with the necessary coordination between the various other contractors and suppliers shall be solely the responsibility of the Mechanical Contractor and with no additional expense to the Owner.

### 2.3 SUBSTITUTIONS

- A. Manufacturer's lists are to establish a Standard of Quality and not intended to limit the selection to these manufacturers. All materials and equipment which are essential and have not been specified or shown shall be new and of the highest grade and quality. Free from defect or other imperfections. It should be understood that where the words "furnished and installed" are used, it is intended that the Mechanical Contractor shall purchase and install all materials required.
- B. All materials and equipment proposed as substitutes for these specified shall require a ten (10) day prior approval from the Engineer prior to the bid date. No substitutions will be allowed after the ten (10) day period before the bid date.

### 2.4 PRODUCT HANDLING

- A. Equipment and materials shall be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored and protected in accordance with the manufacturer's recommendations and as approved by the Architect/Engineer. Equipment installed with a factory finish shall be fully protected during construction and shall be maintained free of dust, dirt, and foreign matter. Dents and other surface damage shall be repaired or replaced to the satisfaction of the Architect/Engineer at no additional cost to the Owner.
- B. The Mechanical Contractor shall clean up and remove from the job site all waste materials, packaging, crating, and refuse resulting from his work on a daily basis.

### 2.5 MATERIALS AND WORKMANSHIP

- A. The Mechanical Contractor shall perform a first class job, both in material and workmanship. None other will be accepted. Deviations from either will be corrected by the Mechanical Contractor at the Mechanical Contractor's expense.
- B. The material used throughout the work, except when otherwise noted, shall be new and of the best of its kind. No substitutes shall be used unless approved by the Architect/Engineer. All work shall be executed with a maximum speed consistent with safety and good workmanship.
- C. Any equipment furnished by the Mechanical Contractor that is larger than those indicated on the Drawings and described in these Specifications or have different electrical characteristics, the increase in cost to the Electrical Contractor for larger wires, conduit, circuit breakers, switches, etc. or for changes in work already installed shall be borne by the instigating Contractor.

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**PART III - EXECUTION****3.1 EXCAVATION AND BACKFILL**

- A. The Mechanical Contractor shall preform any and all trench and pit excavation and backfilling required for the installation of his work. Trenches shall be made with the sides vertical and shall be shored where necessary for the protection of men and equipment. All excavation work shall be done in a careful manner to avoid damage to footers and foundations. The backfilling shall be placed in layers not exceeding four (4) inches in depth, wetting each layer as it is placed, and thoroughly compacting each layer with mechanical tamper or other approved means. Any damage done during excavation and back-filling operations to roads, sidewalks, curbs, shrubs, sod, footers, foundations, etc. shall be replaced to its condition prior to construction at no expense to the Owner.

**3.2 SCAFFOLDING, RIGGING AND HOISTING**

- A. The Mechanical Contractor shall furnish all necessary scaffolding, staging, rigging and hoisting required for the completion of his work. All such scaffolding, etc., shall be removed from the premises when its use is no longer required on the job.

**3.3 CUTTING AND PATCHING**

- A. The Mechanical Contractor shall provide all cutting and patching necessary to install the work specified in this Section. The patching shall match adjacent surfaces.
- B. No Structural member shall be cut without the approval of the Engineer and all such cutting shall be done in a manner directed by him.

**3.4 EQUIPMENT SPACE AND ARRANGEMENT**

- A. The equipment shall fit into the space allotted and shall allow adequate clearance for entry, installation, replacement, servicing and maintenance. The Mechanical Contractor shall coordinate the work to ensure that equipment may be moved into place without altering building components or other installations. Access space shall not be less than the equipment manufacturer's requirements.
- B. These drawings indicate the extent and general arrangement of equipment, piping, and ductwork. If any departures are deemed necessary by the Mechanical Contractor, details of such departures and the reasons therefore shall be submitted to the Architect/Engineer for approval as soon as practicable and within 30 days after Award of Contract. No departure shall be made without written Approval of the Architect/Engineer.

**3.5 DAMAGE TO WORK ALREADY IN PLACE**

- A. The Mechanical Contractor shall assume full responsibility for any damage done by him, his agents or employees, to any work already in place. Any such damage done shall be repaired at the Contractor's expense by mechanics skilled at their respective trades, to the approval of the Architect/Engineer.

**3.6 JURISDICTION OF WORK**

- A. It may become necessary for the Mechanical Contractor to furnish labor or material which is not generally accepted as part of this trade. In cases of this type, he shall contract the work, or shall furnish materials and employ workmen of the trade involved in order not to cause any delay or stoppage of work caused by infringement of trade agreements as to jurisdiction, alleged or actual.

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### 3.7 COORDINATION WITH OTHER TRADES

- A. All work shall be coordinated with other trades involved in the construction project. All work shall be carefully laid out in advance to coordinate Architectural, Structural, Mechanical, Plumbing and Electrical features of construction. The Contractor shall verify at the site all locations, grades, elevations, and utility service connections indicated. Any conflicts due to lack of proper coordination shall be brought to the attention of the Architect/Engineer for resolution. The Mechanical Contractor shall make required changes or relocations at no additional cost to the Owner.
- B. Installation, inspection, and testing of work above ceilings shall be completed and approved by the Architect/Engineer prior to installation of the specified finished ceilings. However, ceiling suspension system may be installed as required for coordination.
- C. The Mechanical Contractor shall consult with the other trades at the start of the work and periodically thereafter, as required to properly coordinate the various items of work, and to avoid interferences. Should any interferences of any nature develop as the work progresses, such interferences shall be resolved and eliminated as directed. The cost of any work directed will be borne by the subcontractor or contractors directed to do this work.

### 3.8 DIVISION OF WORK

- A. This paragraph is intended to show exactly the point of division of work between the Electrical Division and the Mechanical Division.
- B. All equipment covered in the Mechanical Division of the Specifications shall be furnished, mounted and aligned under the Mechanical Division. All individual motor starters, unless indicated as part of a motor control center, for this equipment shall be furnished and installed by the Mechanical Contractor.
- C. All final electrical connections to equipment covered in the Mechanical Division of the Specifications shall be completed under the Mechanical Division.
- D. The Electrical Contractor shall provide a disconnect switch or junction box for each item of equipment under Division 16.
- E. Electrical equipment and wiring that is provided by the Mechanical Contractor shall be in accordance with the Electrical specification.

### 3.9 EQUIPMENT INSTALLATION

- A. Final connections to equipment, including pipe, duct, and controls, shall be provided under applicable sections of this Division, unless otherwise specified or indicated.
- B. Manufacturer's Instructions: Equipment shall be installed as recommended by the manufacturer to conform to the requirements of the particular application, in accordance with these Drawings and Specifications.

### 3.10 OPERATION AND MAINTENANCE MANUALS

- A. One complete Manual as outlined herein shall be submitted for approval before conducting instruction sessions in operation, before systems or equipment tests are performed, and before final or beneficial occupancy.



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- B. Manuals shall have rigid covers and index tabs for each major piece of equipment, auxiliaries, and systems. The following shall be inscribed on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the building, the name of the Section, such as "Heating" and the name of the Mechanical Contractor. Two (2) copies of each approved manual shall be submitted to the Owner and one (1) copy shall be submitted to the Architect/Engineer.
- C. Each piece of equipment shall be listed and identified with the same name, mark, number, or other identification as noted or scheduled in the Contract Documents.
- D. Manuals shall include the following:
1. Complete Operating Installations, covering start-up and shutdown for all components installed.
  2. Legible copies of all Shop Drawings. Any comments incorporated in "as noted" approvals of Shop Drawings shall be recorded on the Drawings included in the Manuals.
  3. All equipment Maintenance and Service Manuals.
  4. A complete parts list for each piece of equipment.
  5. All descriptive literature for the equipment.
  6. Operating characteristics, performance data, ratings, and curves for each piece of equipment such as condensers, fans and air handling units.
  7. Internal wiring and control diagrams.
  8. Automatic temperature control diagrams, part descriptions and numbers, and sequences of operation. Drawings shall be neatly folded and inserted in a separate clear plastic binder. The plastic binders shall be bound in the back of each Manual.
  9. Final Testing and Balancing Reports.
  10. All other information pertinent to the maintenance and servicing of equipment and systems provided in the Project.
  11. Name, address, and telephone number for service on each manufacturer's equipment.

### 3.11 OPERATING INSTRUCTIONS

- A. After all equipment and services are in operation, and the Operation and Maintenance Manuals are available, an instruction and training session shall be conducted for the Owner's operating personnel.
- B. Instruction sessions shall be conducted during the Owner's normal working periods, and at times and locations satisfactory to the Owner.

### 3.12 EQUIPMENT START-UP

- A. No equipment shall be placed in operation until it has been inspected by a qualified representative of the manufacturer and certified to be ready for operation. The manufacturer's representative shall supervise the start-up operation and shall be responsible for all adjustments are required to meet design conditions. Such services

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shall be at no additional cost to the Owner.

### 3.13 GUARANTEE

- A. The Mechanical Contractor shall present to the Owner a written Guarantee covering his work, including all equipment, material and workmanship. This Guarantee shall be against all defects in any of the above work, and shall run for a period of one (1) year from the date of written acceptance of the Contractor's work.
- B. Any defective work, equipment, material and/or workmanship that develops within the Guarantee period, which is not caused by ordinary wear or abuse by other persons, shall be replaced by the Mechanical Contractor without cost to the Owner.

### 3.14 FINAL INSPECTION

- A. When the entire Contract has been completed and the work is ready for final inspection, the Architect/Engineer or his duly authorized representative will make the inspection. At the time of inspection, the Mechanical Contractor shall demonstrate to the Architect/Engineer that the various systems and pieces of equipment have been adjusted to operate in accordance with the requirements of the Contract.

### 3.15 FINAL PAYMENTS

- A. All Final Payments are contingent upon all necessary Certificates and/or Approvals cited above, together with the written Guarantee being presented to the Owner.

END OF SECTION 15500

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**SECTION 15501 - HANGERS AND SUPPORTS****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawing and General Provisions of the Contract, including the General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- B. This Section includes Hangers and Supports for Mechanical Systems Piping and Equipment.

**PART II - PRODUCTS**

## 2.1 PIPE HANGERS AND SUPPORTS

- A. Hangers: Galvanized carbon steel, adjustable, clevis.
- B. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Shield for Insulated Piping 2 Inches and Smaller: 18 gage galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.

## 2.2 HANGER RODS

- A. Steel Hanger Rods: Threaded both ends or continuous threaded.

## 2.3 FLASHING

- A. Metal Flashing: 26 gage galvanized steel.
- B. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

## 2.4 SLEEVES

- A. Sleeves for Pipes: Form with schedule 40, galvanized steel pipe
- B. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated sleeves including seals, UL listed.
- C. Sleeves for Round Ductwork: Form with galvanized steel.
- D. Sleeves for Rectangular Ductwork: Form with galvanized steel or wood.
- E. Fire Stopping Insulation: Glass fiber type, non-combustible.
- F. Caulk: Fire Barrier type sealant.

## 2.5 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.
- B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts.

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- C. Washers: ASTM F 844, steel, plain, flat washers.

2.6 ATTACHMENTS

- A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Permitted in concrete over 4 inches thick.
- B. Beam Clamps: Types 20, 21, 28 or 29
- C. Wood: Wood screws or lag bolts

**PART III - EXECUTION**

3.1 HANGERS AND SUPPORTS INSTALLATION

- A. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Install building attachments within concrete or to structural steel. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping.
- C. Install hangers and support complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- D. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- E. Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- F. Support horizontal piping as follows:

<b>PIPE SIZE</b>	<b>HANGER SPACING</b>	<b>MAXIMUM HANGER DIAMETER</b>
1/2 to 1-1/4 inch	6' - 6"	3/8"
1-1/2 to 2 inch	10' - 0"	3/8"

- G. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- H. Place a hanger within 12 inches of each horizontal elbow.
- I. Use hangers with 1 1/2 inch minimum vertical adjustment.
- J. Support vertical piping at every floor.
- L. Support riser piping independently of connected horizontal piping.
- M. All pipe hangers shall be galvanized steel or copper.
- N. Pipe strapping, duct tape or zip ties will not be allowed.

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### 3.2 EQUIPMENT BASES AND SUPPORTS

- A. Provide equipment bases of concrete.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

### 3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural steel stands to suspend equipment from structure above or support equipment above floor.
- B. Grouting: Place grout under supports for equipment, and make a smooth bearing surface.

### 3.4 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for pipe and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for manual shielded metal arc welding, appearance and quality of welds.

### 3.5 FLASHING

- A. Provide flexible flashing and metal counter-flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Provide curbs for mechanical roof installations 14 inches minimum high above roofing surface. Flexible sheet flash and counter-flash with sheet metal; seal watertight.

### 3.6 SLEEVES

- A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- B. Design hangers without disengagement of supported pipe.
- C. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with fire stopping insulation and caulk seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- D. Install chrome plated steel or stainless steel escutcheons at finished surfaces.

END OF SECTION 15501

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**SECTION 15504 - PIPING INSULATION-REFRIGERANT/CONDENSATE****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Mechanical Pipe Insulation.

## 1.3 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Conform to the following characteristics for insulation including facings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.
  - 1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.
  - 2. Exterior Insulation: Flame spread rating of 75 or less and a smoke developed rating of 150 or less.

## 1.4 SEQUENCING AND SCHEDULING

- A. Schedule insulation application after testing of piping systems.
- B. Schedule insulation application after installation and testing of heat trace tape.

**PART II - PRODUCTS**

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturers
  - 1. Flexible Elastomeric Cellular:
    - a. Armstrong World Industries, Inc.
    - b. Halstead Industrial Products
    - c. IMCOA
    - d. Rubatex Corporation

## 2.3 FLEXIBLE ELASTOMERIC CELLULAR

- A. Material: Flexible expanded closed-cell structure with smooth skin on both sides.
- B. Form: Tubular materials conforming to ASTM C 534, Type I.
- C. Thermal Conductivity: 0.30 average maximum at 75 degrees F.
- D. Coating: Water based latex enamel coating recommended by insulation manufacturer.

## 2.5 ADHESIVES

- A. Flexible Elastomeric Cellular Insulation Adhesive: Solvent-based, contact adhesive recommended by insulation manufacturer.

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**2.8 SEALING COMPOUNDS**

- B. Weatherproof Sealant: Flexible elastomer based, vapor barrier sealant designed to seal metal joints.
  - 1. Water Vapor Permeance: 0.02 perm maximum
  - 2. Temperature Range: Minus 50 to 250 degrees F

**PART III - EXECUTION****3.1 PREPARATION**

- A. Surface Preparation: Clean, dry, and remove foreign materials such as rust, scale, and dirt.

**3.2 INSTALLATION - GENERAL**

- A. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.
- B. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.
- C. Keep insulation materials dry during application and finishing.
- D. Apply insulation continuously over fittings, valves, and specialties.
- E. Apply insulation with a minimum number of joints.
- F. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.
- G. Fire-Rated Walls and Partitions Penetrations: Terminate insulation at penetrations through fire rated walls and partitions. Seal insulation ends with vapor barrier coating. Seal around penetration with fire stopping or fire resistant joint sealer.
- H. Flanges, Fittings, and Valves: Apply pre-molded, pre-cut, or field fabricated segments of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.
  - 1. Use same material and thickness as adjacent pipe insulation.
  - 2. Overlap nesting insulation by 2 inches or 1-pipe diameter, whichever is greater.
  - 3. Apply materials with adhesive, fill voids with mineral fiber insulating cement. Secure with wire or tape.
  - 4. Insulate elbows and tees smaller than 3-inches pipe size with pre-molded insulation.
  - 5. Insulate elbows and tees Three (3) inches and larger with pre-molded insulation or insulation material segments. Use at least 3 segments for each elbow.
- J. Hangers and Anchors: Apply insulation continuously through hangers and around anchor attachments. Install saddles, shields, and inserts as specified.

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1. Inserts and Shields: Cover hanger inserts and shields with jacket material matching adjacent pipe insulation.

### 3.4 FLEXIBLE ELASTOMERIC CELLULAR INSULATION INSTALLATION

- A. Slip insulation on the pipe before making connections wherever possible. Seal joints with adhesive. Where the slip-on technique is not possible, cut one side longitudinally and apply to the pipe. Seal seams and joints with adhesive.
- B. Valves, Fittings, and Flanges: Cut insulation segments from pipe or sheet insulation. Bond to valve, fitting, and flange and seal joints with adhesive.
  1. Miter cut materials to cover soldered elbows and tees.
  2. Fabricate sleeve fitting covers from flexible elastomeric cellular insulation for screwed valves, fittings, and specialties. Miter cut materials. Overlap adjoining pipe insulation.

### 3.6 FINISHES

- A. Flexible Elastomeric Cellular Insulation: After adhesive has fully cured, apply 2 coats of protective coating to exposed insulation. Paint all exterior insulation with UV resistant paint as recommended by Insulation manufacturer.

#### **INTERIOR COLD CONDENSATE DRAINS**

<b><u>PIPE SIZES (NPS)</u></b>	<b><u>MATERIALS</u></b>	<b><u>THICKNESS IN INCHES</u></b>
1/2 TO 4	FLEXIBLE ELASTOMERIC	3/4

#### **REFRIGERANT SUCTION**

<b><u>PIPE SIZES (NPS)</u></b>	<b><u>MATERIALS</u></b>	<b><u>THICKNESS IN INCHES</u></b>
1/2 TO 1-1/4	FLEXIBLE ELASTOMERIC	3/4
1-1/2 TO 4	FLEXIBLE ELASTOMERIC	1

END OF SECTION 15505



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**SECTION 15507 - DUCTWORK INSULATION****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Duct and Plenum Insulation.

## 1.3 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Conform to the following characteristics for insulation including linings, cements, and adhesives, when tested according to ASTM E 84, by UL or other testing or inspecting organization acceptable to the authority having jurisdiction. Label insulation with appropriate markings of testing laboratory.
  - 1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.
  - 2. Exterior Insulation: Flame spread rating of 75 or less and a smoke developed rating of 150 or less.

**PART II – PRODUCTS**

## 2.1 MANUFACTURERS

- I. Glass Fiber:
  - a. Certain Teed Corporation
  - b. Knauf Fiberglass GmbH
  - c. Manville
  - d. Owens-Corning Fiberglass Corporation
  - e. USG Interiors, Inc. - Thermafiber Division

## 2.2 INSTALLATION

## A. GLASS FIBER

- 1. Material: Inorganic glass fibers, bonded with a thermosetting resin.
- B. Jacket: All purpose, factory-applied, laminated glass fiber reinforced, flame retardant Kraft paper and aluminum foil having self-sealing lap.
- C. Blanket: ASTM C 553, Type II, Class F-1, jacketed flexible blankets-2" thick.
  - 1. Thermal Conductivity: 0.32 average maximum, at 75 degrees F mean temperature.
- D. Adhesive: Produced under the UL Classification and follow-up service.
  - 1. Type: Non-Flammable, solvent-based.
  - 2. Service Temperature Range: Minus 20 to 180 degrees F.

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**2.3 ACCESSORIES AND ATTACHMENTS**

- A. Corner Angles: 28-gauge, 1-inch by 1-inch aluminum, adhered to 2-inch by 2-inch Kraft paper.
- B. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

**2.4 SEALING COMPOUNDS**

- A. Vapor Barrier Compound: Water-based, fire-resistive composition
  - 1. Water Vapor Permeance: 0.08 perm maximum
  - 2. Temperature Range: Minus 20 to 180 degrees F

**PART III - EXECUTION****3.1 PREPARATION**

- A. Surface Preparation: Clean, dry, and remove foreign materials such as rust, scale and dirt.

**3.2 INSTALLATION**

- A. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.
- B. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.
- C. Install insulation with smooth, straight, and even surfaces.
- D. Seal joints and seams to maintain vapor barrier.
- E. Seal penetrations for hangers, supports, anchors and other projections.
- F. Keep insulation materials dry during application and finishing.
- H. Blanket Insulation: Install tight and smooth. Secure to ducts having long sides or diameters as follows:
  - 1. Smaller Than 24 Inches: Bonding adhesive applied in 6-inch wide transverse strips on 12-inch centers.
  - 2. Twenty-four (24) Inches and Larger: Anchor pins spaced 12 inches apart each way. Apply bonding adhesive to prevent sagging of the insulation.
  - 3. Overlap joints three (3) inches.
  - 4. Seal joints, breaks, and punctures with vapor barrier compound.

END OF SECTION 15507

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**SECTION 15513 – REFRIGERANT PIPING****PART I - GENERAL**

- 1.1 A. This section includes all pipe, pipe fittings, hangers, supports, etc. as may be required to provide a complete refrigerant piping system.
- B. Testing of all piping shall be made in the presence of a designated representative of the owner. No piping shall be covered or put into operation before such testing has been approved.
- C. The actual arrangement of the piping shall follow the general locations shown on the drawings such that clearances, line drainage, etc. shall be maintained.

**PART II - PRODUCTS**

## 2.1 PIPING

- A. Refrigerant piping shall be type "ACR" hard drawn copper conforming to ANSI B-31.5 or ASTM B280.

## 2.2 PIPE FITTINGS

- A. Copper pipe fittings shall be wrought metal solder joint type conforming to ANSI B16.22.

**PART III - EXECUTION**

## 3.1 PIPING

- A. The installation of piping and related items shall be made neatly and in such a manner as not to interfere with access to valves or equipment.
- B. All piping shall be reamed to remove all burrs, fins and foreign material. Pipe shall be thoroughly cleaned before soldering.
- C. "Sil-Fos" or silver solder shall be used with non-corrosive flux. During the soldering operation, the pipe shall be purged with nitrogen.
- D. Piping shall be arranged (and traps installed where necessary) to allow the proper return of oil to the compressor.

## 3.2 HANGERS AND SUPPORTS

- A. The spacing of hangers and supports shall not exceed five feet.
- B. Pipe covering protection saddles shall be used at all supports for insulated piping. Sheet metal shields shall be 10 gauge, one half the circumference of the insulation and minimum of twelve inches long.

## 3.3 TESTING

- A. All refrigerant equipment not tested at the factory shall be shut off from the rest of the system and tested. Piping systems shall be tested after installation is complete and before any insulation is applied. All controls and other apparatus that may be damaged by the test pressure shall be removed before tests are made.

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- B. Refrigerant lines shall be tested at 150 psig with dry nitrogen. Pressure shall be maintained for 60 minutes without loss of pressure. Each joint shall be checked for leaks with a soap solution. Testing and repair shall continue until there is no loss of pressure. After a satisfactory pressure test, high vacuum pumps shall be connected to the system and the system evacuated to a pressure of 0.20 inches of mercury with the ambient temperature at not less than 36 degrees F. After this has been attained, the vacuum shall be broken by charging the system with refrigerant as soon as possible.

END OF SECTION 15055

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**SECTION 15672 - SPLIT SYSTEM HEAT PUMP****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and a Division 1 Specification Sections, apply to work of this Section.

## 1.2 SUMMARY

- A. Section includes Split System Heat Pumps.

## 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed, and operating), dimensions, required clearances, and methods of assembly of components, furnished specialties and accessories and installation and start-up instructions.
- B. Wiring Diagrams: Submit ladder-type wiring diagrams for power and control wiring required for final installation of heat pump units and controls. Clearly differentiate between portions of wiring which are factory-installed and portions to be field-installed.
- C. Operation and Maintenance Data: Submit maintenance data and parts list for each heat pump unit, control, and accessory; including "trouble shooting" maintenance guide; plus servicing, and preventative maintenance procedures and schedule. Include this data and product data in maintenance manual in accordance with requirements of Division 1.

## 1.4 WARRANTY

- A. Provide Five (5) Year Warranty.
- B. Warranty: Include coverage for Refrigerant Compressors.

**PART II - PRODUCTS**

## 2.1 SPLIT SYSTEM HEAT PUMPS

- A. Acceptable Manufacturers:
  - 1. Carrier Air Conditioning: Division of Carrier Corp.
  - 2. Trane (The) Co.: Division of American Standard Inc.
  - 3. York: Division of York International

## 2.2 GENERAL

- A. Split System: The split-system unit shall be an outdoor heat pump unit and indoor factory-fabricated single-zone draw-through air-handling unit. Both indoor and outdoor unit shall be by the same manufacturer. The net capacities shall be as indicated and shall not exceeded by more than 5%. The minimum efficiency for systems less than 65,000 BTUH shall be 15.0 SEER. The minimum efficiency for systems of 65,000 BTUH or greater shall be in accordance with the 2012 N. C. State Building Code: Energy Conservation Code.

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### 2.3 AIR HANDLER

- A. Direct Expansion Coil: Coil shall be provided with pressure-type brass distributors and solder connections. The coil shall be dehydrated after testing and charged with dry air. Maximum working conditions shall be 300 psig at 200 degrees F for cooling. Tests shall be conducted, subjecting the coil to a minimum air pressure of 350 psig with the coil submerged in water. The cooling coil shall be subject to ASHRAE 15-1978 Safety code for Mechanical Refrigeration. Coils shall be of the cartridge type, removable from other side of casing and supported the entire length in tracks. Staggered tube pattern shall be provided for all coils of more than one row deep. Tubing shall have a minimum outside diameter of 1/2 inch. Tubing shall be individually finned with smooth aluminum or copper fins, wound under tension. Tube joints for all coils shall be made with high temperature brazing alloys.
- B. Cabinet: Unit shall be provided with baked enamel finish and internally insulated. Fan shall be forward curved, and dynamically and statically balanced at the factory. Fan shall be belt driven. Provide adjustable sheaves for each air handler. Fan and motor bearings shall be permanently lubricated type.

### 2.4 OUTDOOR HEAT PUMP UNIT

- A. Unit shall be factory-assembled and tested. Unit shall provide liquid lift as required to suit installation. Unit shall deliver the specified capacity to the cooling coil with an ambient air temperature of 95 degrees F. Units shall be certified per ARI 240 and 270.
- B. Coil shall have aluminum plate fins, mechanically bonded to 1/2 inch aluminum tubes. Coil shall be circuited for sub-cooling.
- C. Outdoor Fans and Motors: Unit shall be furnished with direct-driven, propeller-type fans arranged for vertical discharge. Condenser fan motors shall have Class B motor insulation and built in current and thermal overload protection, and shall be of the permanently lubricated type, resiliently mounted. Each fan shall have a safety guard.
- D. Compressor: Unit shall have compressors of serviceable hermetic design with external spring isolators and an automatically reversible oil pump. Compressor motors shall have across-the-line start.
- E. Controls shall be factory-wired and located in a separate enclosure. Safety devices shall consist of high and low pressure stats and compressor overload devices. Unit wiring shall incorporate a time delay relay to prevent short-cycling of the compressor. Relay shall prevent compressor from restarting for a 5-minute period. The unit shall include a transformer for 24-volt control circuit, pressure relief valves and circuit breakers.
- F. Casing shall make unit fully weatherproof for outdoor installation. Casing shall be of galvanized steel, zinc phosphatized and finished with baked enamel. Openings shall be provided for power and refrigerant connections. Panel shall be removable to provide access for servicing. The unit shall be mounted on manufacturer's standard legs anchored to concrete pedestals with steel bearing plates and neoprene pads.
- G. Connections: Only one liquid line, one suction line, required for units under 15 tons in capacity shall be provided. A 15-ton unit shall be dual circuited. Double suction risers for the refrigerant lines shall be provided.
- H. Piping shall be sized by the manufacturer.

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**2.5 TEMPERATURE CONTROL SYSTEM**

- A. See Section 15973, Direct Digital Controls

**2.6 FILTRATION**

- A. Provide a filter rack and a 1" replaceable pleated throwaway filter. Filter rack size shall be as required by AHU manufacture.
- B. Provide additional sets of filters (minimum of 3) as required during construction. Install a clean set of filters for the Final Inspection.

**PART III - EXECUTION****3.1 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Provide for connection to electrical service.
- C. Install units with vibration isolation.
- D. Install units on concrete base as indicated.

**3.2 MANUFACTURER'S FIELD SERVICES**

- A. Prepare start systems under provisions of Section 15500.
- B. Provide initial start-up.
- C. Supply initial charge of refrigerant and oil for each refrigerant circuit. Replace losses of refrigerant and oil.

END OF SECTION 15672

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**SECTION 15674 DUCT FREE SPLIT SYSTEM AIR CONDITIONER****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and a Division 1 Specification Sections, apply to work of this Section.

## 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed, and operating), dimensions, required clearances, and methods of assembly of components, furnished specialties and accessories and installation and start-up instructions.
- B. Wiring Diagrams: Submit ladder-type wiring diagrams for power and control wiring required for final installation of heat pump units and controls. Clearly differentiate between portions of wiring which are factory-installed and portions to be field-installed.
- C. Operation and Maintenance Data: Submit maintenance data and parts list for each heat pump unit, control, and accessory; including "trouble shooting" maintenance guide; plus servicing, and preventative maintenance procedures and schedule. Include this data and product data in maintenance manual in accordance with requirements of Division 1.

## 1.3 WARRANTY

- A. Provide Five (5) Year Warranty.
- B. Warranty: Include coverage for Refrigerant Compressors.

**PART II - PRODUCTS**

## 2.1 SPLIT SYSTEM AIR CONDITIONER

- A. Acceptable Manufacturers:
  - 1. Mitsubishi
  - 2. Sanyo.
  - 3. Freidrich
  - 4. Amana

## 2.2 GENERAL

- A. Split System: The split-system unit shall be an outdoor condensing unit and indoor factory-fabricated single-zone draw-through air-handling unit. Both indoor and outdoor unit shall be by the same manufacturer. The net capacities shall be as indicated and shall not be exceeded by more than 5%. The minimum efficiency for systems less than 65,000 BTUH shall be 13.0 SEER and shall be in accordance with the 2012 N. C. State Building Code: Energy Conservation Code.

## 2.3 AIR HANDLER

- A. Direct Expansion Coil: Coil shall be provided with pressure-type brass distributors and solder connections. The coil shall be dehydrated after testing and charged with dry air. Maximum working conditions shall be 300 psig at 200 degrees F for cooling. Tests shall



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be conducted, subjecting the coil to a minimum air pressure of 350 psig with the coil submerged in water. The cooling coil shall be subject to ASHRAE 15-1978 Safety code for Mechanical Refrigeration. Staggered tube pattern shall be provided for all coils of more than one row deep. Tubing shall have a minimum outside diameter of 1/2 inch. Tubing shall be individually finned with smooth aluminum or copper fins, wound under tension. Tube joints for all coils shall be made with high temperature brazing alloys.

- B. Cabinet: Unit shall be provided with baked enamel finish and internally insulated. Fan shall be forward curved, and dynamically and statically balanced at the factory. Fan and motor bearings shall be permanently lubricated type.

#### 2.4 OUTDOOR CONDENSING UNIT

- A. Unit shall be factory-assembled and tested. Unit shall provide liquid lift as required to suit installation. Unit shall deliver the specified capacity to the cooling coil with an ambient air temperature of 95 degrees F. Units shall be certified per ARI 240 and 270.
- B. Coil shall have aluminum plate fins, mechanically bonded to 1/2 inch aluminum tubes. Coil shall be circuited for sub-cooling.
- C. Outdoor Fans and Motors: Unit shall be furnished with direct-driven, propeller-type fans arranged for vertical discharge. Condenser fan motors shall have Class B motor insulation and built in current and thermal overload protection, and shall be of the permanently lubricated type, resiliently mounted. Each fan shall have a safety guard.
- D. Compressor: Unit shall have compressors of serviceable hermetic design with external spring isolators and an automatically reversible oil pump. Compressor motors shall have across-the-line start.
- E. Controls shall be factory-wired and located in a separate enclosure. Safety devices shall consist of high and low pressure stats and compressor overload devices. Unit wiring shall incorporate a time delay relay to prevent short-cycling of the compressor. Relay shall prevent compressor from restarting for a 5-minute period. The unit shall include a transformer for 24-volt control circuit, AND pressure relief valve.
- F. Casing shall make unit fully weatherproof for outdoor installation. Casing shall be of galvanized steel, zinc phosphatized and finished with baked enamel. Openings shall be provided for power and refrigerant connections. Panel shall be removable to provide access for servicing. The unit shall be mounted on manufacturer's standard legs anchored to concrete pedestals with steel bearing plates and neoprene pads.
- G. Piping shall be sized by the manufacturer.

#### 2.5 FILTRATION

- A. Provide a throw away filter.
- B. Provide additional sets of filters (minimum of 3) as required during construction. Install a clean set of filters for the Final Inspection.

### PART III - EXECUTION

#### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide for connection to electrical service.

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- C. Install units with vibration isolation.
- D. Install units on concrete base as indicated.

### 3.2 MANUFACTURER'S FIELD SERVICES

- A. Prepare start systems under provisions of Section 15500.
- B. Provide initial start-up.
- C. Supply initial charge of refrigerant and oil for each refrigerant circuit. Replace losses of refrigerant and oil.

END OF SECTION

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**SECTION 15782 –Energy Recovery Ventilator****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

## 1.2 DESCRIPTION OF WORK

- A. Extent of Air Conditioning Unit work required by this Section is indicated on Drawings and Schedules and by Requirements of this Section.

## 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including rated capacities for each unit indicated, weights (shipping, installed, and operating), furnished specialties and accessories; and rigging, installation, and start-up instructions.
- B. Maintenance Data: Submit Maintenance Data and Parts List for each unit, control, and accessory; including "trouble- shooting" maintenance guide. Include this data and product data in Maintenance Manual in accordance with requirements of Division 1.

## 1.4 DELIVERY, STORAGE AND HANDLING

- A. Handle unit and components properly to prevent damage, breaking, denting and scoring. Do not install damaged roof top unit or components; replace with new. Comply with manufacturer's rigging and installation instructions for unloading the unit, and transporting the unit to final location.

## 1.5 WARRANTY

- A. General Warranty: The special warranty specified in this Section shall not deprive the owner of other rights the owner may have under other provisions of the contract documents and shall be in addition to, and run concurrent with, other warranties made by the contractor under requirements of the contract documents.
- B. Special Warranty: A written warranty, executed by the manufacturer and signed by the contractor, agreeing to replace the components that fail in material or workmanship, within the specified warranty period, provided manufacturer's written instructions for installation, operation, and maintenance have been followed.
1. Unit warranty period: Not less than one year after date of start-up, but not to exceed 14 months from date of shipment.
  2. Heat Wheel: Non-prorated full parts replacement not less than 5 years from date of shipment.

**PART II - PRODUCTS**

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
1. Micrometal
  2. Semco
  3. RenewAire

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## 2.2 MANUFACTURED UNITS

- A. Provide complete unit with heat wheel energy recovery.
- B. Unit shall be self-contained, packaged, factory assembled and pre-wired, consisting of cabinet and frame, supply fan, exhaust fan, heat recovery wheel, controls, air filters.

## 2.3 FABRICATION

- A. Cabinet: Galvanized steel with baked enamel finish, access doors or removable access panels with quick fasteners [locking door handle type with piano hinges. Structural members shall be minimum 18 gauge (1.20 mm), with access doors or removable panels of minimum 20 gauge (0.90 mm).
- B. Insulation: One inch thick neoprene coated glass fiber on surfaces where conditioned air is handled. Protect edges from erosion.
- C. Heat Exchangers: Aluminized steel of welded construction.
- D. Supply and Exhaust Fan: Forward curved centrifugal type, resiliently mounted with V-belt drive, adjustable variable pitch motor pulley, and rubber isolated hinge mounted motor.
- E. Air Filters: 2 inch thick pleated glass fiber disposable media in metal frames. Provide at total of 4 complete sets.

## 2.4 ENERGY RECOVERY SECTION

- A. The unit shall have a factory mounted and tested energy recovery wheel. The energy recovery wheel shall be mounted in a rigid frame containing the wheel drive motor, drive belt, wheel seals and bearings.
- B. The energy recovery cassette shall be rated in accordance with ARI Standard 1060 and shall bear the ARI certification symbol.
- C. The energy recovery cassette shall contain a total energy recovery heat wheel constructed of a light-weight polymer material with permanently bonded desiccant coating. The energy recovery wheel media shall be capable of removal from the cassette and replacement without the use of tools. Wheel media shall be cleanable using hot water or light detergent without degrading the efficiency.
- D. The exhaust fan shall be backward inclined type. Fan and motor shall be dynamically balanced. A back draft damper shall be included with the exhaust fan. Outside air filters shall be 4" thick pleated disposable media. Provide a total of 4 sets.
- E. Motors shall be standard efficiency with ball bearings and external lubrication connections.

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**PART III - EXECUTION**

## 3.1 EXAMINATION

- A. Verify that proper power supply is available.

## 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Mount units on field built mounting frame. Install mounting frame level. Mounting frame shall be provided by the HVAC Contractor. Field Coordinate frame and installation required.
- C. See structural drawings for design of mounting frame.

## 3.3 MANUFACTURER'S FIELD SERVICES

- A. Provide initial start-up and standard maintenance during first year of operation, including routine service and check-out.

END OF SECTION 15782

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**SECTION 15870 - POWER VENTILATORS****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Power Ventilators.

## 1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections:
1. Product data for selected models, including specialties, accessories, and the following:
    - a. Motor ratings and electrical characteristics plus motor and fan accessories.
    - b. Materials gauges and finishes.
  2. Shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, required clearances, components, and location and size of field connections.

**PART II - PRODUCTS**

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
1. Carnes Company, Inc.
  2. Cook (Loren) Co.
  3. Greenheck Fan Corp.
  4. Penn Ventilator Co., Inc.

## 2.2 ROOF EXHAUSTERS

- A. Centrifugal Fan Unit: V-belt driven with spun aluminum housing; resilient mounted motor, ½ inch mesh, 16 gauge aluminum bird screen; square base to suit roof curb with continuous curb gaskets; secured with cadmium plated bolts and screws.
- B. Roof Curb: 16 inch high with continuously welded seams and factory installed door nailer strip.
- C. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.
- D. Back Draft Damper: Gravity activated, aluminum multiple blade construction, felt edged with nylon bearings.

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- E. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

### 2.3 WALL EXHAUSTERS

- A. Centrifugal Fan Unit: V-belt driven with spun aluminum housing; resilient mounted motor, ½ inch mesh, 16 gauge aluminum bird screen; secured with cadmium plated bolts and screws.
- B. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.
- C. Back Draft Damper: Gravity activated, aluminum multiple blade construction, felt edged with nylon bearings.
- D. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

### 2.4 CEILING EXHAUST FANS

- A. Centrifugal Fan Unit: V-belt or direct drive with galvanized steel housing lined with ½ inch acoustic insulation, resilient mounted motor, gravity back draft damper in discharge.
- B. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.
- C. Grille: Molded white plastic or aluminum with baked white enamel finish.
- D. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required RPM is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

### 2.5 IN-LINE CABINET EXHAUST FANS

- A. Centrifugal Fan Unit: V-belt or direct driven, with galvanized steel housing lined with ½ inch acoustic insulation, resilient mounted motor, gravity back draft damper in discharge.
- B. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.
- C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required RPM is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

### 2.6 ROOF SUPPLY FAN

- A. Fan Unit: Direct driven axial type, aluminum hood, bird screen, die formed aluminum propeller blades riveted to steel hub, resilient mounted motor square base to suit roof curb.
- B. Roof Curbs: 16 inch high, continuously welded seams, and factory door nailed strip. Roof curb shall have same manufacturer as fan and be supplied by Mechanical Contractor and installed by the General Contractor.
- C. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected

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motor.

**PART III - EXECUTION**

## 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with lag screws to roof curb.

END OF SECTION 15870



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**SECTION 15891 - METAL DUCTWORK****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes low pressure ducts and plenums for heating, ventilating, and air conditioning systems

**PART II - PRODUCTS**

## 2.1 MATERIALS

- A. Steel Ducts: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of G-90 for each side in conformance with ASTM A90.
- B. Insulated Flexible Ducts: Flexible duct wrapped with flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75 degrees F.
- C. Fasteners: Rivets, bolts, or sheet metal screws
- D. Sealant: Liquid non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.
- E. Hanger Rod: Steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

## 2.2 LOW PRESSURE DUCTWORK

- A. Fabricate and support in accordance with SMACNA Low Pressure Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gages, re-inforcing and sealing for operating pressures indicated.
- B. No variation of duct configuration or sizes permitted except by written permission.
- C. Construct T's, bends, and elbows with radius of not less than 1½ times width of duct on center line. Where not possible and where rectangular elbows are used, provide turning vanes.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.
- E. Connect flexible ducts to metal ducts with liquid adhesive.
- F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- G. Use double nuts and lock washers on threaded rod supports.

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2.3 FACTORY FABRICATED DUCTWORK

- A. Duct shall be of standard spiral lock seam or single-rib construction and shall be provided according to the gages given in the following table:

<b>Diameter (inches)</b>	<b>Thickness (inches)</b>
3 - 8	.032
9 - 14	.040
15 - 36	.050

- B. Duct shall be provided in continuous, unjoined lengths wherever possible. Except when interrupted by fittings, round duct sections.
- C. Fittings shall be round and shall have a wall thickness in accordance with the following table:

<b>Fitting Body Diameters (inches)</b>	<b>Minimum Round Fitting Thickness (inches)</b>
3-14	.040
15-26	.050
27-36	.063

- D. Elbows shall be of die-stamped, gored or pleated construction. The bend radius of stamped, gored and pleated elbows shall be 1.5 time the elbow diameter.
- E. All round elbows in diameter of 8 inches or less shall be of die-stamped or pleated construction.
- F. All round elbows in diameter of 9 inches through 14 inches shall be of gored or pleated construction.
- G. All round elbows in diameter greater than 14 inches shall be of gored construction.
- H. Diverging-flow fittings shall be constructed with a radiused entrance to all branch taps and with no excess material projecting from the body into the branch tap entrance.
- I. All take-off or branch entrances shall be by means of factory fabricated fittings.
- J. All fitting ends shall be sized to slip inside mating duct sections. They shall provide a tight fit and have a minimum 2-inch insertion length with a stop bead. No additional coupling shall be required for duct to fitting joints.

**PART III - EXECUTION**

3.1 INSTALLATION

- A. Factory Fabricated ductwork can be substituted for low-pressure field constructed ductwork.
- B. All factory fabricated spiral duct and fittings shall be installed in accordance with manufacturer's recommendations.
- C. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

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- D. Connect diffusers or troffer boots to low pressure ducts with 5 feet maximum length of flexible duct. Hold in place with strap or clamp.
- E. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

### 3.3 ADJUSTING AND CLEANING

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that may be harmed by excessive dirt with temporary filters or bypass during cleaning.
- B. Clean duct systems with high power vacuum machines. Protect equipment that may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

END OF SECTION 15891

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**SECTION 15910 - DUCT ACCESSORIES****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Not used
  - 2. Turning Vanes
  - 3. Duct Mounted Access Doors and Panels
  - 4. Flexible Connectors
  - 5. Flexible Ducts

## 1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data including details for materials, dimensions of individual components, profiles, and finishes.
- C. Shop drawings from manufacturer detailing assemblies: Include dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

**PART II - PRODUCTS**

## 2.3 AIR TURNING DEVICES

- A. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

## 2.4 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.
- B. Provide factory made spin-in starting collars for connections to trunk ducts.

## 2.5 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards and as indicated.
- B. Review locations prior to fabrication.
- C. Fabricate rigid and close fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one-inch thick insulation with sheet metal cover.
- D. Access doors smaller than 12 inches square may be secured with sash locks.

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- E. Provide two hinges and two sash locks for sizes up to 18 inches square, three hinges and two compression latches with outside and inside handles for sizes up to 24 x 48 inches. Provide an additional hinge for larger sizes.
- F. Access doors with sheet metal screw fasteners are not acceptable.

**PART III - EXECUTION**

## 3.1 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions.
- B. Provide balancing dampers at points on low pressure supply systems where branches are taken from larger ducts as required for air balancing. Use splitter dampers only where indicated.
- C. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.
- D. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.
- E. Provide duct test holes where indicated and required for testing and balancing purposes.

END OF SECTION 15910

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**SECTION 15932 - AIR OUTLETS AND INLETS****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

## 1.2 DESCRIPTION OF WORK

- A. Extent of air outlets and inlets work is indicated by Drawings and Schedules and by Requirements of this Section.
- B. Types of outlets and inlets required for this Project include the following:
1. Ceiling Air Diffusers
  2. Wall Registers and Grilles
  3. Louvers

## 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for air outlets and inlets including the following:
1. Schedule of air outlets and inlets indicating drawing designation, room location, number furnished, model number, size and accessories furnished.
  2. Data sheet for each type of air outlet and inlet, and accessory furnished; indicating construction, finish and mounting details.
  3. Performance data for each type of air outlet and inlet furnished, throw and drop; and noise criteria ratings. Indicate selections on data.
- B. Shop Drawings: Submit manufacturer's assembly-type shop drawing for each type of air outlet and inlet, indicating materials and methods of assembly of components.

**PART II - PRODUCTS**

## 2.1 ACCEPTABLE MANUFACTURERS

- A. Diffusers & Grilles
1. Titus, Inc.
  2. Metalaire, Inc.
  3. Carnes, Inc.
  4. E. H. Price
- B. Louvers
1. Arrow United Industries, Inc.
  2. Louvers & Dampers, Inc.
  3. Penn Ventilator Co., Inc.
  4. Ruskin Mfg. Co.
  5. Safe-Air Inc.
  6. Vent Products Co., Inc.
  7. NCA

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8. Cesco Products
- 2.2 RECTANGULAR CEILING DIFFUSERS
- A. Rectangular, extruded aluminum, multi-core type diffuser to discharge air in 360 degree pattern.
  - B. Provide inverted T-bar type frame. In plaster ceilings, provide plaster frame and ceiling frame.
  - C. Fabricate of aluminum with baked enamel off-white finish.
  - D. Provide opposed blade damper with damper adjustable from diffuser face.
- 2.3 CEILING GRID CORE EXHAUST AND RETURN REGISTERS/GRILLES
- A. Fixed grilles of 1/2 x 1/2 x 1 inch egg crate.
  - B. Provide inverted T-bar type frame. In plaster ceilings, provide plaster frame and ceiling frame.
  - C. Fabricate of aluminum with baked enamel off-white finish.
  - D. Where not individually connected to exhaust fans, provide integral, gang-operated opposed blade dampers with removable key operator, operable from face.
- 2.4 WALL SUPPLY REGISTERS/GRILLES
- A. Streamlined and individually adjustable blades, depth of which exceeds 3/4 inch maximum spacing with spring or other device to set blades, horizontal face, double deflection.
  - B. Fabricate 1 1/4 inch margin frame with countersunk screw mounting and gasket.
  - C. Fabricate of aluminum extrusions with 20 gauge minimum frames and 22 gauge minimum blades, with baked enamel off-white finish.
  - D. Provide integral, gang-operated opposed blade dampers with removable key operator, operable from face.
- 2.6 LOUVERS
- A. Provide 4-inch deep louvers with blades on 45 degree slope with center baffle and return bend, heavy channel frame, bird screen with 1/2 inch square mesh.
  - B. Fabricate of 12-gauge extruded aluminum, welded assembly, with factory baked enamel finish. Color selection from manufacturer standard.
  - C. Furnish with interior screw holes in jambs for installation.
- 2.7 ROOF HOODS
- A. Fabricate air inlet or exhaust hoods in accordance with SMACNA Low Pressure Duct Construction Standards.
  - B. Fabricate of aluminum, minimum 16 gauge base and 18 gauge hood; suitably reinforced; with removable hood; bird screen with 1/2 inch square mesh and factory prime coat baked enamel finish.
  - C. Mount unit on minimum 12-inch high curb base with insulation between duct and curb.

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D. Make hood outlet area minimum of twice throat area.

**PART III - EXECUTION**

## 3.1 INSTALLATION

- A. Install items in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry and lighting arrangement.
- C. Install diffusers to ductwork with air-tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black.

END OF SECTION 15932



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**SECTION 15990 - TESTING, ADJUSTING AND BALANCING****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

## 1.2 SUMMARY

- A. This Section specifies the Requirements and Procedures of Total Mechanical Systems Testing, Adjusting and Balancing. Requirements include measurement and establishment of the fluid quantities of the Mechanical Systems as required to meet Design Specifications and Recording and reporting the results.
- B. Testing and Balancing must be conducted by an independent, Certified Testing and Balancing firm, registered with either the AABC or the NEBB.
- C. The Test and Balance Contractor shall be a subcontractor to the Mechanical Contractor.

## 1.3 SECTION INCLUDES

- A. Testing, adjustment and balancing of air systems.
- B. Measurement of final operating condition of HVAC Systems.
- C. Sound measurement of equipment operating conditions.
- D. Vibration measurement of equipment operating conditions.

## 1.4 SUBMITTALS

- A. Submit under provisions of Section 15500.
- B. Submit name of adjusting and balancing agency for approval within 30 days after Award of Contract.
- C. Field Reports: Submit under provisions of Section 15500.
- D. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- E. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.
- F. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Owner and for inclusion in operating and maintenance manuals.
- G. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Report shall reference the Contract Drawings for location of equipment and devices. Where reference to the contract drawings is not satisfactory, include a set of reduced drawings or sketches with equipment and devices identified to correspond with data sheets.
- H. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.

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- I. Test Reports: Indicate data on AABC National Standards for Total System Balance forms or NEBB forms.

#### 1.5 QUALITY ASSURANCE

- A. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance, ASHRAE 111, and NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.
- B. Maintain one copy of each document on site.

#### 1.6 SEQUENCING AND SCHEDULING

- A. Sequence work under the provisions of Section 15500.
- B. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.
- C. Schedule work under the provisions of Section 15500.
- D. Schedule and provide assistance in final adjustment and test of Smoke Control System with Fire Authority.

### **PART II - PRODUCTS (Not Used)**

### **PART III - EXECUTION**

#### 3.1 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
  1. Systems are started and operating in a safe and normal condition.
  2. Control systems are installed complete and operable.
  3. Proper thermal overload protection is in place for electrical equipment.
  4. Ductwork Systems:
    - a. Final filters are clean and in place. If required, install temporary media in addition to final filters.
    - b. Duct systems are clean of debris.
    - c. Fans are rotating correctly.
    - d. Dampers are in place and open.
    - e. Air coil fins are cleaned and combed.
    - f. Access doors are closed and duct end caps are in place.
    - g. Air inlets and outlets are installed and connected.
    - h. Duct system leakage is minimized.
- B. Submit Field Reports: Report defects and deficiencies noted during performance of services which prevent system balance.
- C. Beginning of work means acceptance of existing conditions.

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### 3.2 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Owner to facilitate spot checks during testing.
- B. Provide additional balancing devices as required.

### 3.3 INSTALLATION TOLERANCES

- A. HVAC Systems: Adjust to within plus or minus 5 percent of design for supply and return systems and plus or minus 10 percent of design for exhaust systems.
- B. Air Outlets and Inlets: Adjust outlets and inlets in space to within plus or minus 10 percent of design.

### 3.4 ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of balancing devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

### 3.5 AIR SYSTEM PROCEDURE

- A. Adjust equipment and distribution systems to provide required or design air quantities.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure and record air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Adjust air volume by adjusting duct internal devices such as dampers and splitters. Do not utilize opposed blade dampers at air inlets and outlets.
- F. Vary total system air quantities by adjusting sheave position at each fan. Vary branch air quantities by damper regulation.
- G. Measure and record static air pressure conditions at air supply and exhaust units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- H. Adjust settings and minimum set points for motorized and back draft dampers to design conditions.
- I. Measure and record inlet and outlet temperatures at each air supply unit at full cooling and heating capacity.

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## 3.6 REPORT FORMS

## A. Forms shall include the following:

1. Title Page:
  - a. Name of Testing, Adjusting and Balancing Agency
  - b. Address of Testing, Adjusting and Balancing Agency
  - c. Telephone number of Testing, Adjusting and Balancing Agency
  - d. Project Name
  - e. Project Location
  - f. Project Architect
  - g. Project Engineer
  - h. Project Contractor
  - i. Project Altitude
  - j. Report Date
2. Summary Comments:
  - a. Design versus final performance
  - b. Notable characteristics of system
  - c. Description of systems operation sequence
  - d. Summary of outdoor and exhaust flows to indicate amount of building pressurization
  - e. Nomenclature used throughout report
  - f. Test Conditions
3. Instrument List:
  - a. Instrument
  - b. Manufacturer
  - c. Model Number
  - d. Serial Number
  - e. Range
  - f. Calibration Date
4. Electric Motors:
  - a. Manufacturer
  - b. Model/Frame
  - c. HP/BHP/Efficiency
  - d. Phase, Voltage, Amperage; Nameplate, Actual, No Load
  - e. RPM
  - f. Service Factor
  - g. Starter Size, Rating, Heater Elements
  - h. Sheave Make/Size/Bore
5. V-Belt Drive:
  - a. Identification/Location
  - b. Required Driven RPM
  - c. Driven Sheave, Diameter and RPM
  - d. Belt, Size and Quantity
  - e. Motor Sheave Diameter and RPM
  - f. Center to center distance, maximum, minimum, and actual
6. Equipment Data:
  - a. Identification/number
  - b. Manufacturer
  - c. Model number and Serial number

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- d. Capacity
- e. Service
- f. Design flow rate, pressure drop, BHP
  
- g. Actual flow rate, pressure drop, BHP
- h. Temperature readings
  
- 7. Duct Traverse:
  - a. System zone/branch
  - b. Duct size
  - c. Area
  - d. Design velocity
  - e. Design air flow
  - f. Test velocity
  - g. Test air flow
  - h. Duct static pressure
  - i. Air temperature
  - j. Correction factor
  
- 8. Air Distribution Test Sheet:
  - a. Air terminal number
  - b. Room number/location
  - c. Terminal type
  - d. Terminal size
  - e. Area factor
  - f. Design velocity
  - g. Design air flow
  - h. Test (final) velocity
  - i. Test (final) air flow
  - j. Percent of design air flow

### 3.7 SOUND AND VIBRATION TESTING

- A. Test and adjust Mechanical Systems for sound and vibration in accordance with the detailed instructions of the referenced Standards.
  
- B. Sound Level Test and Report:
  - 1. Location
  - 2. Octave Bands - equipment off
  - 3. Octave Bands - equipment on
  
- C. Vibration Test and Report:
  - 1. Location of Points:
    - a. Fan bearing: drive end
    - b. Fan bearing: opposite end
    - c. Motor bearing: center (if applicable)
    - d. Motor bearing: drive end
    - e. Motor bearing: opposite end
    - f. Casing: (bottom or top)
    - g. Casing: (side)
    - h. Duct after flexible connection: (discharge)
    - i. Duct after flexible connection: (suction)
  
  - 2. Test Readings:
    - a. Horizontal, velocity and displacement
    - b. Vertical, velocity and displacement
    - c. Axial, velocity and displacement

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3. Normally acceptable readings, velocity and acceleration
4. Unusual conditions at time of test
5. Vibration source (if non-complying)

END OF SECTION 15990

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**DIVISION 16: ELECTRICAL**

16010	Basic Electrical Requirements
16050	Basic Electrical Materials and Methods
16100	Raceways, Boxes and Cabinets
16120	Wires and Cables
16140	Wiring Devices
16190	Supporting Devices
16195	Electrical Identification
16452	Grounding
16470	Panel Boards
16476	Disconnects
16515	Interior Lighting

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**SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS****PART I - GENERAL**

## 1.1 GENERAL CONDITIONS

- A. The Stipulations and Conditions stated in this Section, together with all provisions of the "Instructions to Bidders", "General Conditions", "Supplemental General Conditions" and "Special Conditions", hereinbefore set forth, shall apply to this and the other Sections of Division 16.

## 1.2 GENERAL REQUIREMENTS

- A. The General Requirements hereinafter listed apply to the Electrical Work Division. If there is any conflict between the General Requirements and the General Conditions, the General Conditions shall take precedence.

## 1.3 ALTERNATES

- A. Carefully examine all alternates at the back of this Specification and on the Drawings to determine if any work described under the Electrical Section will be affected thereby.

## 1.4 INTENT

- A. The intent of these Drawings and Specifications are to describe the installation of a complete, fully adjusted, and operational system. Therefore, any items shown on Drawings and not specifically called for in the Specifications, or any items specified and not specifically indicated or detailed on the Drawings, or any items neither specified or shown, but which are reasonably incidental to and commonly required to make a complete job, will be furnished and installed by the Electrical Contractor at his own expense.

## 1.5 DEFINITIONS

- A. The Electrical Contractor shall provide all supervision, labor, material equipment, machinery, plant, and any and all other items necessary to complete the Electrical systems. All items of equipment are specified in the singular; however, the Electrical Contractor shall provide the number of items of equipment as indicated on the drawings, and as required for complete systems.

Where the word "provide" is used, it shall mean "furnish and install complete and ready to use".

## 1.6 VISIT TO THE SITE

- A. The Electrical Contractor shall visit the site before submitting his bid so as to be thoroughly familiar with the job conditions and/or peculiarities. No extra payment will be allowed for anything which could have been anticipated from a visit to the site.

## 1.7 REGULATORY REQUIREMENTS

- A. All work under this section shall be accomplished in strict accordance with State codes. Where these plans and specifications conflict with such codes, the codes shall govern.
- B. The Electrical Contractor shall notify the Architect or Engineer of such conflicts in writing prior to receipt of bids.
- C. References to the National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL),



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- and National Fire Protection Association (NFPA) are a minimum installation requirement.
- D. The following regulatory shall be used as minimum standards:

AEIC	American Association of Edison Illuminating Companies
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronic Engineers
NCCM	N.C. Construction Manual w/G.S. as listed
NCSBC	N.C. State Building Code
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
U/L	Underwriters' Laboratories, Inc.
OSHA	Occupational Safety and Health Standards
ASHRAE/IES	90.1 energy code

#### 1.8 TEST STANDARDS

- A. All material and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc., or third party agencies accredited by the North Carolina Building Code Councils latest edition or amendment.

#### 1.9 PERMITS AND FEES

- A. NA

#### 1.10 DRAWINGS AND SPECIFICATIONS

- A. The Electrical Drawings and Specifications are intended to cover all the work enumerated under the respective headings. The Drawings are diagrammatic only. No Contractor shall take advantage of conflict or error between Drawings and Specifications, or between General Drawings and Mechanical, Plumbing and/or Electrical Drawings, but shall request a clarification of such from the Architect/Engineer, should this condition exist. If there is insufficient time to issue an Addendum for this clarification, the Electrical Contractor shall include in his bid the most expensive of the items in conflict.
- B. The Electrical Contractor shall refer to the Architectural and Structural Drawings and Specifications for the general construction of the building, for floors and ceiling heights, for locations of walls, partitions, beams, etc., and shall be guided accordingly for setting of all sleeves, inserts and equipment. No Contractor shall under any circumstances scale drawings for the location of equipment. The Electrical Contractor shall verify the locations of all utility services and electrical equipment.
- C. The Electrical Contractor shall keep at least one set of corrected Shop and Design Drawings at the site. Drawings are to be current, denoting approved modifications and actual installed departure. Submit Drawings to Architect/Engineer before final payment is made.

#### 1.11 SUPERVISION

- A. The Electrical Contractor performing the work specified shall be required to employ a qualified superintendent or foreman to continuously supervise the installation of their work, with authorization to act as agent. He shall be capable of checking layouts, coordinating and supervising the work, establishing grades and levels and locating chases, openings, hangers, inserts, sleeves, etc.

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**PART II - PRODUCTS****2.1 STANDARD PRODUCTS**

- A. Unless otherwise indicated in writing by the Architect/Engineer, the materials to be provided under this Specification shall be standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest design. All items of the same type or rating shall be identical.

**2.2 SUBMITTAL**

- A. The Electrical Contractor shall submit, for approval, detailed Shop Drawings on all major equipment and where requested. No materials or equipment may be delivered to the job site or installed until the Electrical Contractor has in his possession the approved Shop Drawing for the particular material or equipment. The Electrical Contractor shall furnish the number of copies required by the General or Special Conditions of the contract, but no case less than six (6) copies.
- B. Submitted material shall be properly labeled indicating specific service for which material or equipment is to be used, Section and Article Number of Specifications governing, Contractor's name and name of job.
- C. Approval of equipment will not relieve the Electrical Contractor of compliance with the Specifications even if such approval is made in writing, unless the attention of the Engineer is called to the non-complying features by letter accompanying the submittal data. Approval of submittal data by the Engineer shall not be construed as a complete check of approval of detailed dimensions, weights, gauges, and similar details with the proposed articles. The conformance with the necessary coordination between the various other Contractors and suppliers shall be solely the responsibility of the Electrical Contractor and with no additional expense to the Owner.

**2.3 SUBSTITUTIONS**

- A. Manufacturer's lists are to establish a standard of quality and not intended to limit the selection to these manufacturers. All materials and equipment which are essential and have not been specified or shown shall be new and of the highest grade and quality free from defect or other imperfections. It should be understood that where the words "furnished and installed" are used, it is intended that the Electrical Contractor shall purchase and install all materials required, unless otherwise noted.
- B. All materials and equipment proposed as substitutes for these specified shall require a ten (10) day prior approval from the Engineer prior to the bid date. No substitutions will be allowed after the ten (10) day period before the bid date.
- C. All products shall be furnished in compliance with NC General Statute 133-3.

**2.4 PRODUCT HANDLING**

- A. Equipment and materials shall be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored and protected in accordance with the manufacturer's recommendations and as approved by the Architect/Engineer. Equipment installed with a factory finish shall be fully protected during construction and shall be maintained free of dust, dirt and foreign matter. Dents and other surface damage shall be repaired or replaced to the satisfaction of the Architect/Engineer at no additional cost to the Owner.

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- B. The Electrical Contractor shall clean up and remove from the job site all waste materials, packaging, crating, and refuse resulting from his work on a daily basis.

## 2.5 MATERIALS AND WORKMANSHIP

- A. The Electrical Contractor shall perform a first class job, both in material and workmanship. None other will be accepted. Deviations from either will be corrected by the Electrical Contractor at the Electrical Contractor's expense.
- B. The material used throughout the work, except when otherwise noted, shall be new and of Specification grade and the best of its kind. No substitutes shall be used unless approved by the Architect/Engineer. All work shall be executed with a maximum speed consistent with safety and good workmanship.
- C. Any equipment furnished by the Mechanical Contractor or any other Contractor that is larger than those indicated on the Drawings and described in these Specifications or have different Electrical characteristics, the increase in cost to the Electrical Contractor for larger wires, conduit, circuit breakers, switches, etc. or for changes in work already installed shall be borne by the instigating Contractor.

## PART III - EXECUTION

### 3.1 EXCAVATION AND BACKFILL

- A. The Electrical Contractor shall perform any and all trench and pit excavation and backfilling required for the installation of his work. Trenches shall be made with the sides vertical and shall be shored where necessary for the protection of men and equipment. All excavation work shall be done in a careful manner to avoid damage to footers and foundations. The backfilling shall be placed in layers not exceeding 4 inches in depth, wetting each layer as it is placed and thoroughly compacting each layer with Mechanical tamper or other approved means. Any damage done during excavation and backfilling operations to roads, sidewalks, curbs, shrubs, sod, footers, foundations, etc. shall be replaced to its original condition prior to construction at no expense to the owner. All work will be approved by the Engineer.

### 3.2 SCAFFOLDING, RIGGING AND HOISTING

- A. The Electrical Contractor shall furnish all necessary scaffolding, staging, rigging and hoisting required for the completion of his work. All such scaffolding, etc., shall be removed from the premises when its use is no longer required on the job.

### 3.3 CUTTING AND PATCHING

- A. The Electrical Contractor shall provide all cutting and patching necessary to install the work specified in the 16000 Sections. The patching shall match adjacent surface material and finishes.
- B. No Structural member shall be cut without the approval of the Engineer and all such cutting shall be done in a manner directed by him.
- C. Cutting or Holes:
  - 1. Locate holes in advance where they are proposed in the Structural Sections such as ribs or beams. Obtain the approval of the Engineer prior to drilling through Structural Sections.
  - 2. Cut holes through concrete and masonry in new and existing structures with a

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diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed.

### 3.4 WATERPROOFING

- A. At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight. All work subject to approval of the Engineer.

### 3.5 EQUIPMENT SPACE AND ARRANGEMENT

- A. The equipment shall fit into the space allotted and shall allow adequate clearance for entry, installation, replacement, servicing, and maintenance. The Electrical Contractor shall coordinate the work to ensure that equipment may be moved into place without altering building components or other installations. Access space shall not be less than the equipment manufacturer's requirements. Working clearances shall be not less than N.E.C or other regulatory requirements.
- B. These drawings indicate the extent and general arrangement of equipment. If any departures are deemed necessary by the Electrical Contractor, details of such departures and the reasons therefore shall be submitted to the Architect/Engineer for approval as soon as practicable and within 30 days after Award of the Contract. No departure shall be made without written approval of the Architect/Engineer. Any delay on the Contractor's part to provide such submittal will not constitute an extension of the Contract time.

### 3.6 DAMAGE TO WORK ALREADY IN PLACE

- A. The Electrical Contractor shall assume full responsibility for any damage done by him, his agents or employees, to any work already in place. Any such damage done shall be repaired at the Contractor's expense by Mechanics skilled at their respective trades, to the approval of the Architect/Engineer.

### 3.7 JURISDICTION OF WORK

- A. It may become necessary for the Electrical Contractor to furnish labor or materials which are not generally accepted as part of this trade. In cases of this type, he shall contract the work or shall furnish materials and employ workmen of the trade involved in order not to cause any delay or stoppage of work caused by infringement of Trade Agreements as to jurisdiction, alleged or actual.

### 3.8 COORDINATION WITH OTHER TRADES

- A. All work shall be coordinated with other trades involved in the construction project. All work shall be carefully laid out in advance to coordinate Architectural, Structural, Mechanical, Plumbing and Electrical features of construction. The Contractor shall verify at the site all locations, grades, elevations and utility service connections indicated. Any conflicts due to lack of proper coordination shall be brought to the attention of the Architect/Engineer for resolution. The Electrical Contractor shall make required changes or relocations at no additional cost to the Owner.
- B. Installation, inspection, and testing of work above ceilings shall be completed and approved by the Architect/Engineer prior to installation of the specified finished ceilings. However, a Ceiling Suspension System may be installed as required for coordination.
- C. The Electrical Contractor shall consult with the other trades at the start of the work and periodically thereafter, as required to properly coordinate the various items of work, and to avoid interferences. Should any interferences of any nature develop as the work progresses, such interferences shall be resolved and eliminated as directed. The cost of

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any work directed shall be borne by the Subcontractor or Contractors directed to do this work.

### 3.9 DIVISION OF WORK

- A. These paragraphs are intended to show exactly the point of division of work between the Electrical Division and the Mechanical Division or any other division.
- C. All equipment covered in the Mechanical Division or any other Division of the Specifications shall be furnished, mounted, and aligned under the respective Division. All starters, controls and wiring for this equipment, including final connection to the same, shall be furnished and installed under that Division.
- D. Divisions of the Specifications shall be completed under the respective Division.
- E. Under Division 16, the Contractor shall be responsible for providing all line side power wiring, conduit, disconnect switches, and junction boxes as shown on the electrical drawings.

### 3.10 EQUIPMENT INSTALLATION

- A. Manufacturer's Instructions: Equipment shall be installed as recommended by the manufacturer to conform to the requirements of the particular application, in accordance with these Drawings and Specifications.

### 3.11 OPERATION AND MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 1 Section "PROJECT CLOSEOUT". In addition to the requirements specified in Division 1, include the following information for equipment items:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
  - 2. Manufacturer's printed Operating Procedures to include start-up, break-in, and routine and normal Operating Instructions; regulation, control, stopping, shutdown, and emergency instructions and summer and winter operating instructions.
  - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and re-assembly; aligning and adjusting instructions.
  - 4. Servicing Instructions and Lubrication Charts and Schedules.

### 3.12 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements in Division 1 Section "PROJECT CLOSEOUT". In addition to the requirements specified in Division 1, indicate installed conditions for:
  - 1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.

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2. Equipment locations (exposed and concealed) dimensioned from prominent building lines.
3. Approved substitutions, Contract modifications and actual equipment and materials installed.

### 3.13 GUARANTEE

- A. The Electrical Contractor shall present to the Owner a written guarantee covering his work, including all equipment, material and workmanship. This guarantee shall be against all defects in any of the above work, and shall run for a period of one (1) year from the date of written acceptance of the Contractor's work.
- B. Any defective work, equipment, material and/or workmanship that develops within the Guarantee period, which is not caused by ordinary wear or abuse by other persons, shall be replaced by the Electrical Contractor without cost to the Owner.

### 3.14 FINAL INSPECTION

- A. When the entire Contract has been completed and the work is ready for final inspection, the Architect/Engineer or his duly authorized representative will make the inspection. At the time of inspection, the Electrical Contractor shall demonstrate to the Architect/Engineer that the various systems and pieces of equipment have been adjusted to operate in accordance with the requirements of the Contract.
- B. An authorized Inspector from the North Carolina Department of Insurance shall inspect the project during construction and upon completion of the construction phase. It shall be the responsibility of the Electrical Contractor to notify the Inspector as the work progresses. The NCDOI Inspector can be reached at (919) 661-5880.**

### 3.15 FINAL PAYMENTS

- A. All Final Payments are contingent upon all necessary Certificates and/or Approvals cited above, together with the written Guarantee being presented to the Owner.

### 3.16 DOCUMENTATION

- A. All tests shall be completely documented indicated time of day, temperature, and all pertinent test information.
- B. All required documentation of readings shall be submitted to the engineer prior to, and as one of the prerequisites for, final acceptance of the project.

END OF SECTION 16010

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**SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes limited Scope, General Construction Materials and Methods for Application with Electrical Installations as follows:
1. Miscellaneous metals for support of electrical materials and equipment.
  2. Joint sealers for sealing around electrical materials and equipment; and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.

## 1.3 DEFINITIONS

- A. The following definitions apply to excavation operations:
1. Additional Excavation: Where excavation has reached required subgrade elevations, if unsuitable bearing materials are encountered, continue excavation until suitable bearing materials are reached. The Contract Sum may be adjusted by an appropriate Contract Modification.
  2. Sub-Base: As used in this Section refers to the compacted soil layer used in pavement systems between the subgrade and the pavement base course material.
  3. Sub-Grade: As used in this Section refers to the compacted soil immediately below the slab or pavement system.
  4. Unauthorized excavation consists of removal of materials beyond indicated sub-grade elevations or dimensions without specific direction from the Architect.

## 1.4 SEQUENCE AND SCHEDULING

- A. Coordinate the shut-off and disconnection of electrical service with the Owner and the utility company.

**PART II - PRODUCTS**

## 2.1 SOIL MATERIALS

- A. Sub-Base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, or natural or crushed sand.
- B. Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing a 1½ inch sieve, and not more than 5 percent passing a No. 4 sieve.
- C. Backfill and Fill Materials: Materials complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, and SP; free of clay, rock, or gravel larger than 2 inches

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in any dimension; debris; waste; frozen materials; and vegetable and other deleterious matter.

## 2.2 MISCELLANEOUS METALS

- A. Steel plates, shapes, bars, and bar grating: ASTM A 36.
- B. Cold-Formed Steel Tubing: ASTM A 500.
- C. Hot-Rolled Steel Tubing: ASTM A 501.
- D. Steel Pipe: ASTM A 53, Schedule 40, welded.
- E. Fasteners: Zinc-coated, type, grade and class as required.

## PART III - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and application of joint sealers. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 EXCAVATION

- A. Slope sides of excavations to comply with local codes and ordinances. Shore and brace as required for stability of excavation.
- B. Install sediment and erosion control measures in accordance with local codes and ordinances.
- C. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.
  - 1. Do not allow water to accumulate in excavations. Remove water to prevent softening of bearing materials.
  - 2. Provide and establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey surface water to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.
- D. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
  - 1. Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.
  - 2. Remove and legally dispose of excess excavated materials and materials not acceptable for use as backfill or fill.
- E. Trenching: Excavate trenches for electrical installations as follows:
  - 1. Excavate trenches to the uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches clearance on both sides of raceways and equipment.



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2. Excavate trenches to depth indicated or required.
  3. Limit the length of open trench to that in which installations can be made and the trench backfilled within the same day.
  4. Where rock is encountered, carry excavation below required elevation and backfill with a layer of crushed stone or gravel prior to installation of raceways and equipment. Provide a minimum of 6 inches of stone or gravel cushion between rock bearing surface and electrical installations.
- F. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F (1 degree 2 C).
- G. Backfilling and Filling: Place soil materials in layers to required subgrade elevations for each area classification listed below, using materials specified in Part 2 of this Section.
1. Under walks and pavements, use a combination of sub-base materials and excavated or borrowed materials.
  2. Under building slabs, use drainage fill materials.
  3. Under piping and equipment, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation.
  4. For raceways less than 30 inches below surface of roadways, provide 4-inch thick concrete base slab support. After installation of raceways, provide a 4-inch thick concrete encasement (sides and top) prior to backfilling and placement of roadway sub-base.
  5. Other areas, use excavated or borrowed materials.
- H. Backfill excavations as promptly as work permits, but not until completion of the following:
1. Inspection, testing, approval, and locations of underground utilities have been recorded.
  2. Removal of concrete formwork.
  3. Removal of shoring and bracing and backfilling of voids.
  4. Removal of trash and debris.
- I. Placement and Compaction: Place backfill and fill materials in layers of not more than eight (8) inches in loose depth for material compacted by heavy equipment, and not more than four (4) inches in loose depth for material compacted by hand operated tampers.
- J. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification specified below. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- K. Place backfill and fill materials evenly adjacent to structures, piping, and equipment to required elevations. Prevent displacement of raceways and equipment by carrying material uniformly around them to approximately same elevation in each lift.
- L. Compaction: Control soil compaction during construction, providing minimum percentage of density specified for each area classification indicated below.

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1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils), determined in accordance with ASTM D 1557 and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture density relationship (cohesion-less soils).
2. Areas Under Structures, Building Slabs and Steps, Pavements: Compact top 12 inches of material, or 95 percent relative density for cohesionless material.
  - a. Areas Under Walkways: Compact top 6 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material or 95 percent relative density for cohesionless material.
  - b. Other Areas: Compact top 6 inches of subgrade and each layer of backfill or fill material to 85 percent maximum density for cohesive soils, and 90 percent relative density for cohesionless soils.
3. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water. Apply water in minimum quantity necessary to achieve required moisture content and to prevent water appearing on surface during, or subsequent to, compaction operations.
4. Subsidence: Where subsidence occurs at electrical installation excavations during the period 12 months after Substantial Completion, remove surface treatment (i.e., pavement, lawn, or other finish), add backfill material, compact to specified conditions, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent areas.

### 3.3 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS "Structural Welding Code".

END OF SECTION 16050

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**SECTION 16100 - RACEWAYS, BOXES AND CABINETS****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Raceways, Fittings, Boxes, Enclosures and Cabinets for Electrical Wiring.

**PART II - PRODUCTS**

## 2.1 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1
- B. Intermediate Metal Conduit: ANSI C80.6
- C. Electrical Metallic Tubing and Fittings: ANSI C80.3 with compression-type fittings.
- D. Flexible Metal Conduit: Zinc coated steel
- E. Liquid tight Flexible Metal Conduit: Flexible steel conduit with PVC jacket.
- F. Fittings: NEMA FB 1, compatible with conduit/tubing materials.
- G. Non-Metallic Rigid Conduit: Schedule 40 pvc as where shown on the drawings.
- H. "MC" type cable.

## 2.2 OUTLET AND DEVICE BOXES

- A. Sheet Metal Boxes: NEMA OS 1
- B. Cast Metal Boxes: NEMA FB 1, type FD, cast alloy box with gasketed cover

## 2.3 PULL AND JUNCTION BOXES

- A. Small Sheet Metal Boxes: NEMA OS 1.
- B. Cast Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- C. Pull Boxes: Code gauge steel with screw type removable cover. NEMA rated for the condition.

**PART III - EXECUTION**

## 3.1 EXAMINATION

- A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of the raceway system. Do not proceed with installation until unsatisfactory conditions have been

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- corrected.
- 3.2 MINIMUM CONDUIT SIZE: (unless indicated otherwise) on the drawings conduit shall be sized as follows:
- A. Indoors: The minimum conduit size shall be 1/2".
    - 1. Flexible metal conduit may be used for tap connection to recessed lighting fixtures.
  - B. Outdoors: Branch circuit conduit installed below grade to exterior equipment shall be one (1) inch minimum unless noted otherwise.
- 3.3 WIRING METHODS: Unless noted otherwise on the drawings the following materials shall be used:
- A. Outdoors: Use the following wiring methods:
    - 1. Exposed: Rigid or intermediate metal conduit.
    - 2. Underground: Galvanized Rigid Conduit.
    - 3. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Liquid tight flexible metal conduit.
    - 4. Boxes and Enclosures: NEMA Type 3R or Type 4.
  - B. Indoors: Use the following wiring methods:
    - 1. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Flexible metal conduit, except in wet or damp locations use liquid tight flexible metal conduit.
    - 2. Damp or Wet Locations: Rigid steel conduit.
    - 3. Exposed: Electrical metallic tubing above 8 feet and rigid metallic conduit below eight (8) feet.
    - 4. Concealed: Electrical metallic tubing or MC cable.
    - 5. Boxes and Enclosures: NEMA Type 1, except in damp or wet locations use NEMA Type 3R, unless otherwise noted.
- 3.4 INSTALLATION
- A. Telephone/Data/Cable TV outlet boxes shall be 2 gang with appropriate trim and cover. Coordinate cover plates with Owner.
  - B. Provide insulated bushings for all conduit ends.
  - C. Conceal rigid conduit and EMT, unless otherwise indicated, within finished walls, ceilings, above attic space and below floors.
  - D. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.
  - E. Install raceways level and square and at proper elevations. Provide adequate headroom.
  - F. Complete raceway installation before starting conductor installation.

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- G. Use temporary closures to prevent foreign matter from entering raceway.
- H. Protect stubs from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.
- I. **Where non-metallic conduit is shown to be used below the slab provide rigid conduit to turn up into the building space or at all exterior walls, poles or equipment.**
- J. Use raceway fittings compatible with raceway and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, except as otherwise indicated.
- K. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions, except as otherwise indicated. Where the number of bends exceed the total number required by the N.E.C., provide pull boxes as required by code.
- L. Install raceways parallel to or at right angles to surfaces or structural members, and follow the surface contours as much as practical.
1. Run parallel or banked raceways together, on common supports where practical.
  2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where they can be installed parallel; otherwise, provide field bends for parallel raceways.
- M. Join raceways with fittings designed and approved for the purpose and make joints tight.
1. Use bonding jumpers where joints cannot be made tight.
  2. Use insulating bushings to protect conductors.
  3. Provide expansion joint fittings where required for the raceway used.
- N. IMC and GRC shall terminate with either a double locknut/bushing set or in a threaded hub.
- O. Where conduit type "LB" fittings are used all conduits on conduits over 2" in size shall be "MOGAL" type.
- P. **"EMT" connectors shall be steel plated hexagonal compression type only. Do not use pot metal, set-screw, or indenter type connectors.**
- Q. Where concentric, eccentric, or oversized knockouts are encountered, a grounding-type insulated bushing shall be provided.
- R. Where conduits of any type pass over a building expansion joint, a standard "expansion joint" fitting, compatible with the type raceway, shall be provided.
- S. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.
- T. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the

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raceway so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

- U. Install pull cords in all empty raceways. Use monofilament plastic line having not less than 200-lb (90 kg) tensile strength. Leave not less than 12 inches (300 mm) of slack at each end of the pull cord.
- V. Telephone and Signal System Raceways 2 Inch Trade Size and Smaller: In addition to the above requirements, install in maximum lengths of 150 feet (45 m) and with a maximum of two 90-degree bends or equivalent. Install pull or junction boxes where necessary to comply with these requirements. Pull boxes shall be a minimum of 10" square x 6" deep with removable cover.
- W. Install raceway sealing fittings at suitable, approved, accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points and elsewhere as indicated:
  - 1. Where conduits enter or leave hazardous classified locations.
  - 2. Where conduits pass from warm locations to cold locations, such as exterior spaces and air-conditioned spaces.
  - 3. Where otherwise required by the NEC.
- X. Stub-Up Connections: Extend conduits through concrete floor a minimum of 6" for connection to freestanding equipment. Extend conductors to equipment with flexible metal conduit. Where equipment connections are not made under this Contract verify the length of the flexible connectors.
- Y. Flexible Connections: Use maximum of 6 feet (1830 mm) of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquid tight flexible conduit in wet or damp locations. Install separate ground conductor.
- AA. Provide grounding connections for raceway, boxes and components. Tighten connectors and terminals according to tightening torques specified in UL Standard 486A.
- BB. All underground raceways shall be identified by "UNDERGROUND LINE MARKING TAPE" located directly above the raceway at 6" below finished grade. Tape shall be permanent, bright-colored, continuous, magnetic strip, printed, plastic tape compounded for direct burial not less than 6" wide and 4 mils thick. Printed legend shall be indicative of the service it is marking. Provide sufficient tape not less than 2/3 of the width of the item marked for the full length of the Raceway.
- CC. Where underground raceways are required to turn up into cabinets, equipment, etc., and on to poles, the elbow required and the sub-up out of the slab or earth shall be rigid steel.
- DD. Where shown to be used on the drawings PVC non-metallic conduit used exterior to the building for grouped circuits it shall be encased in a minimum of 3" of 3000 psi rated concrete. Concrete encased non-metallic ducts shall be supported on plastic separators coordinated with duct size and spacing. Separators shall be spaced close enough to prevent sagging and deforming of ducts. Secure separators to the earth and to ducts to prevent floating during placement of concrete. Do not use steel or tie wires in such a way to form conductive or magnetic loops around ducts or duct groups.
- EE. The Raceway System shall not be relied on for grounding continuity. A green grounding conductor, properly sized per NEC Table 250-122, shall be run in all power raceways.

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- FF. Where non-metallic conduit is allowed on the drawings all bends and off-sets shall be made by approved mechanical benders per the manufacturers instruction. Any conduit not in compliance will be removed.

### 3.5 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, to ensure that coatings, finishes, and cabinets are without damage or deterioration at Substantial Completion.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  2. Repair damage to paint finishes with matching touch-up coating recommended by the manufacturer.

### 3.6 CLEANING

- A. Upon completion of installation of system, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt and construction debris and repair damaged finish, including chips.

END OF SECTION 16100

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**SECTION 16120 - WIRES AND CABLES****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Building Wires and Cables and Associated Splices, Connectors and Terminations for Wiring Systems rated 600 Volts and Less.

**PART II - PRODUCTS**

## 2.1 BUILDING WIRES AND CABLES

- A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3 "Applications" Article.
- B. Rubber Insulation: Conform to NEMA WC 3.
- C. Thermoplastic Insulation: Conform to NEMA WC 5.
- D. Cross-Linked Polyethylene Insulation: Conform to NEMA WC 7.
- E. Ethylene Propylene Rubber Insulation: Conform to NEMA WC 8.
- F. Solid conductor for 10 AWG and smaller: Stranded conductor for larger than 10 AWG.

## 2.2 CONNECTORS AND SPLICES

- A. UL-listed factory fabricated wiring connectors of size, ampacity rating, material, and type and class for application and for service indicated.

**PART III - EXECUTION**

## 3.1 EXAMINATION

- A. Examine raceways and building finishes to receive wires and cables for compliance with installation tolerances and other conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

## 3.2 APPLICATIONS

- A. Feeders and Branch Circuits: Type THHN\THWN or XHHW, copper conductor, in raceway.

## 3.3 INSTALLATION

- A. All conductors shall be copper.
- B. Minimum conductor size for power and lighting circuits shall be #12 AWG. Maximum conductor size shall be 500 KCMIL AWG.



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- C. All power and lighting circuits #10 awg and smaller shall be solid copper conductors. Conductor sizes #8 awg and larger shall be Class "B" stranded copper conductors.
- D. Pull conductors into raceway simultaneously where more than one is being installed in same raceway.
  - 1. Use pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation.
  - 2. Use pulling means, including fish tape, cable, rope, and basket weave wire/cable grips that will not damage cables or raceway.
- E. Conductor Splices: Keep to minimum.
- F. Wiring at Outlets: Install with at least 8 inches of slack conductor at each outlet.
- G. Connect outlets and components to wiring and to ground as indicated. Tighten to UL Standard 486A.
- H. Power and Lighting circuits shall have individual neutral conductors.**
- I. All power circuits noted for computer equipment with isolated grounding shall be individually installed in a separate conduit with separate phase, neutral conductor, grounding conductor, and isolated grounding conductor, unless noted otherwise.
- J. In no case shall any wire installed to a device exceed the U.L. rating of the device.

### 3.4 SPLICING

- A. Joints in solid conductors shall be using Idea "wire nuts", 3M Company "scotch lock", or "T&B" "PIGGY" connectors in junction boxes, outlet boxes and lighting fixtures.
- B. "Sta-kon" or other permanent type crimp connectors shall not be used for branch circuit connections.
- C. Joints in stranded conductors shall be spliced by approved mechanical connectors. Solderless mechanical connectors similar to "NSI" multi-cable connector blocks for splices and taps, provided with UL approved insulating covers, may be used instead of mechanical connectors plus tape.
- D. Conductors in all cases, shall be continuous from outlet to outlet unless "taps" are required and shall be made only within outlet, junction boxes, troughs and gutters.

### 3.5 VOLTAGE DROP

- A. Where conductor length from the panel to the first outlet on a 120 volt circuit exceeds 100 feet, the branch circuit conductors from the panel to the first outlet shall be not smaller than #10 awg.

### 3.6 FIELD QUALITY CONTROL

- A. Testing: Upon installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
  - 1. Procedures: Perform each Visual and Mechanical Inspection and Electrical Test stated in NETA Standard ATS, Section 7.3.1. Certify compliance with test parameters.
- B. Correct malfunctioning products at site, where possible, and re-test to demonstrate

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compliance; otherwise, remove and replace with new units and re-test.

3.7 ELECTRICAL TESTING

A. Feeder Insulation Resistance Testing:

1. All current carrying phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. This shall be done with a 500-volt megger. The procedures listed below shall be followed:
2. Minimum readings shall be one million (1,000,000) or more ohms for # 6 AWG wire and smaller, 250,000 ohms or more for #4 wire or larger, between conductor and the grounding conductor.
3. After all devices and equipment are installed and all connections completed to each panel, the Contractor shall disconnect the neutral feeder conductor from the neutral bar and take a megger reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the Contractor shall disconnect the branch circuit neutral wires from the neutral bar. Test each neutral conductor separately until the low readings are found. The Contractor shall correct troubles, reconnect and re-test until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
4. The Contractor shall send a letter to the Engineer certifying that the above has been done and tabulating the megger readings for each panel. This shall be done at least four (4) days prior to final inspection.
5. At the final inspection, the Contractor shall furnish a megger and show the Engineers that the panels comply with the above requirements. He shall also furnish a hook-on type ammeter and a voltmeter and take current and voltage readings as directed by the representatives.

END OF SECTION 16120

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**SECTION 16140 - WIRING DEVICES****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes various types of receptacles, connectors, switches and finish plates.

## 1.3 SUBMITTALS

- A. Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each product specified.

**PART II - PRODUCTS**

## 2.1 WIRING DEVICES

- A. Comply with NEMA Standard WD 1-101968, "General Purpose Wiring Devices".
- B. Enclosures: NEMA 1 equivalent, except as otherwise indicated.
- C. Color: Selected by Architect.
- D. Duplex receptacles shall be of the grounding type arranged for back and side wiring, with separate single or double grounding terminals. Receptacles shall be straight blade, rated 20 amp, 125 volt and the face configuration shall conform to the NEMA Standard No. WD-1, NEMA WD-6, DSCC W-C-596G & UL 498, and shall be approved third party listed. Self-grounding or automatic type grounding receptacles are not acceptable in lieu of receptacles with separate grounding screw lugs and a direct green insulated conductor connection to the equipment grounding system. Receptacles shall be specification grade mounted vertically.
- E. Receptacles, Straight-Blade, Special Features: Comply with the basic requirements specified above for straight-blade receptacles of the class and type indicated, and with the following additional requirements:
  - 1. Ground Fault Circuit Interrupter (GFCI) Receptacles: UL Standard 943, "Ground Fault Circuit Interrupters" with integral NEMA 5-20R duplex receptacle. Design units for installation in a 2¾ inch (70-mm) deep outlet box without an adapter.
- F. Receptacles, Industrial Heavy-Duty: Conform to NEMA Standard PK 4 "Plugs, Receptacles and Cable Connectors of the Pin and Sleeve type for Industrial Use".
- G. Plug Sets: Match voltage and current ratings and number of conductors to requirements of the equipment being connected.
- H. Single pole and three or four-way toggle type as indicated on the drawings. Switches shall be of the grounding type with hex-head grounding screw rated 20 amp 120/277V AC only. Lighted handle switches shall have neon lights of the correct voltage rating

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where indicated on the drawings. All switches shall have quiet operating mechanisms without the use of mercury switches. All switches shall be listed by an approved third-party agency, approved for the voltage and amperage indicated. Color selected by Architect.

- I. Motion Sensor Switches
  1. Single Pole-single switching
  2. Single Pole-double switching
  3. Switches shall be combination ultrasonic and passive infrared.
  4. 100 square foot coverage, 180 degree.
  5. 120 volt: 800 watt incandescent, 1000 watt fluorescent.
  6. 277 volt, 1800 watt fluorescent.
  7. 5 year warranty.
- J. Wall Plates: Single and combination types that mate and match with corresponding wiring devices. Features include the following:
  1. Material for Finished Spaces: 0.04 inch thick, type 302, satin finished stainless steel, intermediate jumbo size except as otherwise indicated.
  2. Material for Unfinished Spaces: Galvanized cast ferrous steel, standard size.
  3. Provide a quantity of 2% spare cover plates for each type of device cover used to the Owner.

### **PART III - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install devices and assemblies plumb and secure.
- B. Install wall plates when painting is complete.
  1. Arrangement of Devices: Except as otherwise indicated, mount flush, with long dimension vertical and grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
- C. Protect devices and assemblies during painting.
- D. Adjust locations at which floor service outlets are installed to suit the indicated arrangement of partitions and furnishings.
- E. Field verify the actual location of all outlet devices above equipment or counter tops before rough-in and installation. Any outlet installed in conflict with equipment or conditions that could have been avoided, will be corrected at the Contractor's expense.
- F. Provide weatherproof cast aluminum cover plates for all devices exterior to the building or in "wet" locations, Hubbell WP26M or equal.
- G. GFCI protection shall be provided for all receptacles exterior to the building, in restrooms

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or where required by Code.

- H. Locate all receptacles in rated walls with 24" minimum horizontal separation. This includes devices located opposite each other in the walls.

### 3.2 IDENTIFICATION

- A. Comply with Division 16 Section "Electrical Identification".
  - 1. Switches: Where 3 or more switches are ganged and elsewhere where indicated, identify each switch with approved legend engraved on wall plate.
  - 2. Receptacles: Identify the panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of plate and durable wire markers or tags within outlet boxes.

### 3.3 FIELD QUALITY CONTROL

- A. Testing: Test wiring devices for proper polarity and ground continuity. Operate each operable device at least six (6) times.
- B. Test ground-fault circuit interrupter operation with both local and remote fault simulations according to manufacturer recommendations.
- C. Replace damaged or defective components.

### 3.4 CLEANING

- A. General: Internally clean devices, device outlet boxes and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION 16140

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**SECTION 16190 - SUPPORTING DEVICES****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes secure support from the building structure for Electrical items by means of Hangers, Supports, Anchors, Sleeves, Inserts, Seals and Associated Fastenings.

## 1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of product specified.

**PART II - PRODUCTS**

## 2.1 COATINGS

- A. Coating: Supports, support hardware and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish and inherent material characteristic. Products for use outdoors shall be hot-dip galvanized.

## 2.2 MANUFACTURED SUPPORTING DEVICES

- A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C clamps with retainers, ceiling trapeze hangers, wall brackets and spring steel clamps.
  - 1. Expansion Anchors: Carbon steel wedge or sleeve type.
  - 2. Toggle Bolts: All steel spring-head type.
- B. Conduit Sealing Bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps and cap screws.
- C. U-Channel Systems: 16-gage steel channels, with 9/16-inch diameter holes, at a minimum of 8 inches on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacturer.

## 2.3 FABRICATED SUPPORTING DEVICES

- A. General: Shop or field fabricated supports or manufactured supports assembled from U-Channel components.
- B. Steel Brackets: Fabricated of angles, channels and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.

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- C. Pipe Sleeves: Provide pipe sleeves of one of the following:
1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snap-lock joint, welded spiral seams, or welded longitudinal joint. Fabricate sleeves from the following gage metal for sleeve diameter noted:
    - a. 3-inch and smaller: 20-gage
    - b. 4-inch to 6-inch: 16-gage
  2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe.
  3. Plastic Pipe: Fabricate from Schedule 80 PVC plastic pipe.

### PART III - EXECUTION

#### 3.1 INSTALLATION

- A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.
- B. Coordinate with the building structural system and with other electrical installation.
- C. Raceway Supports: Comply with the NEC and the following requirements:
1. Strength of each support shall be adequate to carry present and future load multiplied by a safety factor of at least four. Where this determination results in a safety allowance of less than 200 lbs, provide additional strength until there is a minimum of 200 lbs safety allowance in the strength of each support.
  2. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
  3. Support parallel runs of horizontal raceways together on trapeze-type hangers.
  4. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1 inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use ¼ inch diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.
  5. Space supports for raceway's types not covered by the above in accordance with NEC.
  6. Support exposed and concealed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at the box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.
  7. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.
  8. In interior spaces provide a minimum of ¼ inch space for all conduits installed on the exterior building walls. Approved "clamp-back" or strut devices shall be used.

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- D. Miscellaneous Supports: Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers and other devices.
- E. In open overhead spaces, cast boxes threaded to raceways need not be supported separately except where used for fixture support; support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved type of fastener not more than 24 inches from the box.
- F. Conduit Seals: Install bushing seals for conduit penetrations of slabs on grade and exterior walls below grade. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal.
- G. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cables, cable trays, bus ways, cabinets, panelboards, transformers, boxes, disconnect switches and control components in accordance with the following:
  - 1. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry and machine screws, welded threaded studs, or spring-tension clamps on steel. Do not weld conduit, pipe straps or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.

END OF SECTION 16190



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**SECTION 16195 - ELECTRICAL IDENTIFICATION****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Identification of Electrical Materials, Equipment and Installations.

## 1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.

**PART II - PRODUCTS**

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Ideal Industries, Inc.
  - 2. National Band and Tag Co.
  - 3. Panduit Corp.
  - 4. Seton Name Plate Co.
  - 5. Standard Signs, Inc.
  - 6. W.H. Brady, Co.

## 2.2 ELECTRICAL IDENTIFICATION PRODUCTS

- A. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width. Colors to match color schemes noted herein.
- B. Underground Line Marking Tape: Permanent, bright colored, continuous printed, metallic strip, plastic tape compounded for direct burial service not less than 6 inches wide by 4 mils thick. Printed legend indicative of general type of underground line below.
- C. Wire/Cable Designation Tape Markers: Vinyl or vinyl cloth, self adhesive, wrap-around, cable/conductor markers with pre-printed numbers and letter.
- D. Furnish and install engraved laminated phenolic nameplates for all safety switches, panelboards, transformers, switchboards, switchboard branch breakers, motor control centers and other electrical equipment. Nameplates shall be securely attached with self-tapping stainless steel screws, if the screw end is protected; otherwise rivets shall be used. Letters shall be approximately 1/2" high minimum. Embossed self-adhesive tape is not acceptable for marking equipment.
- E. Cable Ties: Fungus inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18-inch minimum width, 50-lb minimum tensile strength, and suitable for a temperature range from minus 50 degrees F to 350 degrees F. Provide ties in specified colors when used for color coding.

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**PART III - EXECUTION**

## 3.1 INSTALLATION

- A. Lettering and Graphics: Coordinate names, abbreviations, colors and other designations used in Electrical Identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.
- B. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.
- C. Identify Junction, Pull, and Connection Boxes: Install on outside of box cover. Label box covers with identity of contained circuits. Use pressure-sensitive plastic labels at exposed locations and similar labels concealed boxes. Color code boxes as indicated below. Method shall be by colored adhesive not less than 4 square inches for 4" boxes and larger boxes. Permanent type "magic" markers are not accepted as a means of identification.

120/208 volt blue

- D. Underground Electrical Line Identification: During trench backfilling, for exterior underground power, signal and communications lines, install continuous underground plastic line marker, located directly above line at 6 inches below finished grade where multiple lines are installed in a common trench or concrete envelope. Provide marker tape to cover 2/3 of the overall width.
- E. Conductor Color Coding: Provide color coding for secondary service, feeder, and branch circuit conductors throughout the project secondary electrical system as follows:

<b><u>230/120 Volts</u></b>	<b><u>Phase</u></b>
Black	A
Red	B
White	Neutral
Green	Ground

- G. Use conductors with color factory-applied the entire length of the conductors except as follows:
1. The following field-applied color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.
    - a. Apply colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent possible unwinding. Use 1-inch wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration minimum width 2".
- H. Tag or label conductors as follows:
1. Multiple Circuits: Where multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by mean of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at

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terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.

2. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.
- I. Install equipment/system circuit/device identification as follows:
    1. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with 1/2 inch high lettering on 1½ inch high label (2 inch high where two lines are required), white lettering in blue field for normal power equipment other face colors shall match the equipment served. Text shall match terminology and numbering of the Contract Documents and shop drawings.
    2. All Phenolic labels shall be securely attached to the equipment by self-tapping stainless steel screws.
    3. Name plate colors shall be as follows:

....Blue surface with white core for 120/230 Volt Equipment.
  - J. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panelboards and alarm/signal components, where labeling is specified elsewhere. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker. Pencil in all spare and leave spaces blank.
  - K. All outlet boxes, junction boxes and pull boxes shall have their covers and exterior visible surfaces painted with colors to match the surface color scheme specified. This includes covers on boxes above lay-in and other type accessible ceilings.
  - L. All empty conduit runs and conduit with conductors for future use shall be identified for use and shall indicate where they terminate. Identification shall be by pressure sensitive label applied to the conduit or outlet; designate "use" and "location served".

END OF SECTION 16195

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**SECTION 16452 - GROUNDING****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Solid Grounding of Electrical Systems and Equipment. It includes basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other Sections of these Specifications.

## 1.3 QUALITY ASSURANCE

- A. Listing and Labeling: Provide products specified in this Section that are listed and labeled. The terms "listed" and "labeled" shall be defined as they are in the National Electrical Code, Article 100.

**PART II - PRODUCTS**

## 2.1 GROUNDING AND BONDING PRODUCTS

- A. Products: Of types indicated and of sizes and ratings to comply with NEC. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.
- B. Conductor Materials: Copper

## 2.2 WIRE AND CABLE CONDUCTORS

- A. General: Comply with Division 16 Section "Wires and Cables". Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.
- B. Equipment Grounding Conductor: Green insulated
- C. Grounding Electrode Conductor: Stranded cable
- D. Bare Copper Conductors: Conform to the following:
- |    |                                  |           |
|----|----------------------------------|-----------|
| 1. | Solid Conductors:                | ASTM B-3  |
| 2. | Assembly of Stranded Conductors: | ASTM B-8  |
| 3. | Tinned Conductors:               | ASTM B-33 |

## 2.3 MISCELLANEOUS CONDUCTORS

- A. Ground Bus: Bare annealed copper bars of rectangular cross section, full-size rated.
- B. Braided Bonding Jumpers: Copper tape, braided No. 30 gauge bare copper wire, terminated with copper ferrules.
- C. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

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**2.4 CONNECTOR PRODUCTS**

- A. General: Listed and labeled as Grounding Connectors for the materials used.
- B. Pressure Connectors: High conductivity-plated units
- C. Bolted Clamps: Heavy-duty units listed for the application

**2.5 GROUNDING ELECTRODES**

- A. Ground Rods: Copper-clad steel with high strength steel core and electrolytic grade copper outer sheath, molten welded to core.
  - 1. Size: 3/4 inch by 10 feet

**PART III - EXECUTION****3.1 APPLICATION**

- A. Equipment Grounding Conductor Application: Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except where larger sizes or more conductors are indicated.
  - 1. The raceway system shall not be relied on for ground continuity .Install an equipment ground conductor in all power related conduits. Size conductor as required by NEC Table 250-122. Data and Signal conduits do not require a separate grounding conductor unless required by the manufacturer of the equipment to be installed.
- C. Signal and Communications: For telephone, alarm, and communication systems, provide a #6 AWG minimum green insulated copper conductor in raceway from the grounding electrode system to each terminal equipment location. Leave 3' pigtail wiring at termination point where equipment boards are shown. Make direct connection where equipment is provided.

**3.2 INSTALLATION**

- A. General: Ground electrical systems and equipment in accordance with NEC requirements except where the Drawings or Specifications exceed NEC requirements.
- B. The electrical service shall be grounded by three (3) means:
  - 1. To the cold water main, if metallic and in direct contact with the earth for at least 10 feet as per the NEC Article 250-81.
  - 2. To the steel frame of the building, provided the building frame is effectively grounded.
  - 3. To ground rod(s)
- C. Ground Rods: Locate a minimum of one-rod length from each other and at least the same distance from any other grounding electrode. Interconnect ground rods with bare conductors buried at least 24 inches below grade. Connect bare-cable ground conductors to ground rods by means of exothermic welds except as otherwise indicated. Make these connections without damaging the copper coating or exposing the steel. Use 3/4 inch by 10 ft. ground rods except as otherwise indicated. Drive rods until tops are 6

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inches below finished floor or final grade except as otherwise indicated. All ground connections shall be accessible.

- D. Metallic Water Service Pipe: Provide insulated copper ground conductors, sized as indicated, in conduit from the building main service equipment, or the ground bus, to main metallic water service entrances to the building. Connect ground conductors to the main metallic water service pipes by means of ground clamps. Where a dielectric main water fitting is installed, connect the ground conductor to the street side of the fitting. Do not install a grounding jumper around dielectric fittings. Bond the ground conductor conduit to the conductor at each end.
- E. Route grounding conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.

### 3.3 CONNECTIONS

- A. General: Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
  - 1. Use electroplated or hot tin-coated materials to assure high conductivity and make contact points closer in order of galvanic series.
  - 2. Make connections with clean bare metal at points of contact.
  - 3. Aluminum to steel connections shall be with stainless steel separators and mechanical clamps.
  - 4. Aluminum to galvanized steel connections shall be with tin-plated copper jumpers and mechanical clamps.
  - 5. Coat and seal connections involving dissimilar metals with inert material such as red lead paint to prevent future penetration of moisture to contact surfaces.
- B. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure-type grounding lugs. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to the ground bus in the housing. Bond electrically non-continuous conduits at both entrances and exits with grounding bushings and bare grounding conductors.
- C. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A and UL 486B.
- D. Compression-Type Connections: Use hydraulic compression tools to provide the correct circumferential pressure for compression connectors. Use tools and dies recommended by the manufacturer of the connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the ground conductor.

### 3.4 FIELD QUALITY CONTROL

- A. Tests: Subject the completed grounding system to a megger test at each location where a maximum ground resistance level is specified, at service disconnect enclosure ground terminal, and at ground test wells. Measure ground resistance without the soil being

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moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the 2 point method in accordance with Section 9.03 of IEEE 81, "Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System".

B. Service Grounding Test

1. After completion of the electrical grounding and bonding systems, test the ground resistance with a ground resistance tester. Where test shown resistance-to-ground is over 25 ohms, provide additional ground rods until the minimum of 25 ohms is achieved.

C. Deficiencies: Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values. Where measures are detected that exceed those indicated the provisions of the Contract, covering changes will apply.

D. Report: Prepare test reports of the ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

3.5 CLEANING AND ADJUSTING

A. Restore surface features at areas disturbed by excavation and re-establish original grades. Where sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other Work to their original condition. Include necessary topsoil, fertilizing, liming, seeding, sodding, sprigging, or mulching.

END OF SECTION 16452

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**SECTION 16470 – PANEL BOARDS****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Lighting and Power Panel Boards and Associated Auxiliary Equipment Rated 600 V or Less

## 1.3 DEFINITIONS

- A. Panel Boards: A panel board with thermal magnetic circuit-breaker branches, designed for residential and light commercial projects, operating at 600 V and below, available in both single and 3-phase versions, and equipped with combination flush/surface mounting trim.
- B. Over-current Protective Device (OCPD): A device operative on excessive current that causes and maintains the interruption of power in the circuit it protects.

## 1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type panel board, accessory item, and component specified.
- C. Shop Drawings from manufacturers of panel boards including dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features and voltage rating.
- D. Include the following:
  - 1. Enclosure type with details for types other than NEMA Type 1.
  - 2. Bus configuration and current ratings.
  - 3. Short-circuit current rating of panelboard.
  - 4. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.

## 1.5 QUALITY ASSURANCE

- A. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
  - 1. The terms "listed" and "labeled" shall be defined as they are in the National Electrical Code, Article 100.
- B. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code".
- C. NEMA Standard: Comply with NEMA PB1, "Panel Boards".
- D. UL Standards: Comply with UL 61, "Panel Boards", and UL 50, "Cabinets and Boxes".



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**PART II - PRODUCTS**

## 2.1 MANUFACTURERS

## A. Acceptable Manufacturers:

1. Cutler Hammer
2. Square D
3. Siemens

## 2.2 PANELBOARDS - GENERAL REQUIREMENTS

- A. Over-current Protective Devices (OCPDs): Provide type, rating, and features as indicated on the schedules. Tandem circuit breakers shall not be used. Multiple breakers shall have common trip.
- B. Circuit Breakers shall be bolt-on type.
- C. 100% rated copper Ground and Neutral Bus (unless noted otherwise).
- D. Enclosures: Cabinets, flush or surface mounted as indicated. NEMA Type 1 enclosure.
- E. Front: Secured to box with concealed trim clamps except as indicated. Front for surface-mounted panels shall be same dimensions as box. Fronts for flush panels shall overlap box except as otherwise specified.
- F. Directory Frame: Metal, mounted inside each panel door.
- G. Bus: Hard drawn copper of 98 percent conductivity
- H. Main and Neutral Lugs: Bolt-on type
- I. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors.
- K. Provision for Future Devices: Equip with mounting brackets, bus connections, and necessary appurtenances, for the OCPD ampere ratings indicated for future installation of devices.
- L. Feed-through panels are not permitted.
- M. The use of series breakers is not permitted.
- N. Flash protection boundary and the incident energy for the electrical equipment shall be determined in accordance with IEEE 1584 and NFPA 70E requirements.

## 2.3 IDENTIFICATION

- A. Panel Board Nameplates: Engraved laminated plastic or metal nameplate for each panel board mounted with self-tapping stainless steel screws.

**PART III - EXECUTION**

## 3.1 INSTALLATION

- A. General: Install panel boards and accessory items in accordance with NEMA PB 1.1, "General Instructions for Proper Installation, Operation and Maintenance of Panel Boards Rated 600 Volts or Less" and manufacturers' written installation instructions.

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- B. Mounting Heights: Top of trim 6'-2" above finished floor, except as indicated.
- C. Mounting: Plumb and rigid without distortion of box. Mount flush panels uniformly flush with wall finish.
- D. Circuit Directory: Typed and reflective of final circuit changes required to balance panel loads. Obtain approval before installing. Pencil all spares. Spaces shall be left blank.
- E. Install filler plates in unused spaces.
- F. Provision for Future Circuits at Flush Panel Boards: Stub four 1-inch empty conduits from panel into accessible ceiling space or space designated to be ceiling space in future.
- G. Wiring in Panel Gutters: Train conductors neatly in groups, bundle and wrap with wire ties after completion of load balancing.

## 3.2 GROUNDING

- A. Connections: Make equipment grounding connections for panelboards as indicated.
- B. Provide ground continuity to main electrical ground bus indicated.

## 3.3 CONNECTIONS

- A. All connections shall be provided per UL 486A and UL 486B.

## 3.4 FIELD QUALITY CONTROL

- A. Quality Control Program: Conform to the following:
  - 1. Procedures: Field tests and Inspections will be made by the Engineer at time of completion of the work and in accordance these Specifications.
  - 2. Schedule tests with at least one (1) week in advance notification.
- B. Visual and Mechanical Inspection: Include the following inspections and related work:
  - 1. Inspect for defects and physical damage, labeling, and nameplate compliance with requirements of up-to-date Drawings and Panel Board Schedules.
  - 2. Exercise and perform of operational tests of all Mechanical components and other operable devices in accordance with manufacturer's Instruction Manual.
  - 3. Check panel board mounting, area clearances and alignment and fit of components.
  - 4. Check tightness of bolted electrical connections with calibrated torque wrench.

## 3.5 CLEANING

- A. Upon completion of installation, inspect interior and exterior of panel boards. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

END OF SECTION 16470

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**SECTION 16476 – DISCONNECTS****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes Equipment and Service disconnects.

## 1.3 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for Switches and Accessories specified in this Section.

## 1.4 QUALITY ASSURANCE

- A. Comply with NFPA 70 "National Electrical Code" for components and installation.
- B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
  - 1. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code", Article 100.

**PART II - PRODUCTS**

## 2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
  - 1. Cutler-Hammer Products; Eaton Corp.
  - 2. Siemens
  - 3. Square D Company

## 2.2 ENCLOSED SWITCHES

- A. Enclosed Non-Fusible Switch: NEMA KS 1, Type HD, handle lockable with 2 padlocks.
- B. Enclosed Fusible Switch, 800 Amperes and Smaller: NEMA KS 1, Type HD, clips to accommodate specified fuses, enclosure consistent with environment where located, handle lockable with 2 padlocks, and interlocked with cover in CLOSED position.
- C. Enclosure: NEMA KS 1, Type 1, unless specified or required otherwise to meet environmental conditions of installed location.
- D. Outdoor Locations: Type 3R
- E. Other Wet or Damp Indoor Locations: Type 4
- F. All switches shall be "Heavy Duty" rated for the voltage required.
- G. Coordinate all fuse rated switches with the equipment to be furnished. Furnish fuses.

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- H. Safety switches shall be third-party listed.
- I. Switches shall have defeatable door interlocks that prevent the door from opening when the operating handle is in the open position.
- J. Switches shall have handles whose positions are easily recognizable in the "on" or "off" position. For safety reasons, padlocks shall be provided for switches located in the public areas.
- K. Switches shall have nontearable, positive, quick make-quick-break mechanisms.
- L. Switches shall be properly labeled. See section 16195, Electrical Identification.

### **PART III - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install enclosed switches level and plumb.
- B. Where fuses are required, the fuses shall be matched with the equipment supplier's requirements.
- C. Provide one additional set of fuses for each disconnect switch.

#### **3.2 FIELD QUALITY CONTROL**

- A. Testing: After installing enclosed switches and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
- B. Correct malfunctioning units at site, where possible, and retest to demonstrate compliance. Otherwise, remove and replace with new units and re-test.

#### **3.3 CLEANING**

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, construction debris and repair damaged finish including chips, scratches and abrasions.

END OF SECTION 16476

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**SECTION 16515 - INTERIOR LIGHTING****PART I - GENERAL**

## 1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes interior lighting fixtures, lamps, ballasts, emergency lighting units, and accessories.

## 1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data describing fixtures, lamps, ballasts, and emergency lighting units. Arrange product data for fixtures in order of fixture designation. Include data on features and accessories and the following information:
  - 1. Outline drawings of fixtures indicating dimensions and principal features.
  - 2. Electrical ratings and photometric data with specified lamps and certified results of independent laboratory tests.
  - 3. Data on batteries and chargers of emergency lighting units.
  - 4. Shop Drawings from manufacturers detailing non-standard fixtures and indicating dimensions, weights, methods of field assembly, components, features and accessories.
  - 5. Non-returnable samples, when requested by Engineer, for verification purposes of specific individual fixtures.

## 1.4 QUALITY ASSURANCE

- A. Comply with NFPA 70 "National Electrical Code" for components and installation.
- B. Listing and Labeling: Provide fixtures that are listed and labeled for their indicated use on the Project.
- C. Coordination of Fixtures With Ceiling: Coordinate fixtures mounting hardware and trim with the ceiling system. Provide plaster or sheet-rock trims when required on the project whether indicated or not at no additional cost to the Owner. Coordinate with Architectural Plans before ordering fixtures.

## 1.5 WARRANTY

- A. Minimum warranty period on emergency lights shall be three (3) years from date acceptance. Warranty shall include all parts (less lamps).
- B. All other lighting products shall be warranted for a period of not less than 1 year from date of acceptance. This warranty does not include miscellaneous parts which are external to the product (i.e. lamps) which are considered maintenance item.

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**PART II - PRODUCTS**

## 2.1 FIXTURES - GENERAL

- A. Comply with the requirements specified in the Articles below and the Lighting Fixture Schedule on the Drawings.

## 2.2 FIXTURE COMPONENTS - GENERAL

- A. Metal Parts: Free from burrs and sharp corners and edges.
- B. Sheet Metal Components: Steel, except as indicated. Components are formed and supported to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating and free from light leakage under operating conditions. Arrange to permit re-lamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during re-lamping and when secured in the operating position. Light seal strips inside the fixture will not be allowed.
- D. Reflecting Surfaces: Minimum reflectances as follows, except as otherwise indicated:
- |                                     |            |
|-------------------------------------|------------|
| 1. White Surfaces:                  | 85 percent |
| 2. Specular Surfaces:               | 83 percent |
| 3. Diffusing Specular Surfaces:     | 75 percent |
| 4. Laminated Silver Metalized Film: | 90 percent |
- E. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic
- |   |  |
|---|--|
| 1. Plastic: Highly resistance to yellowing and other changes due to aging, exposure to heat and UV radiation. |  |
| 2. Lens Thickness: 0.125 inches minimum   |  |

## 2.3 SUSPENDED FIXTURE SUPPORT COMPONENTS

- A. Single-Stem Hangers: ½ inch steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.
- B. Twin-Stem Hangers: Two, ½ inch steel tubes with single canopy arranged to mount a single fixture. Finish same as fixture.
- C. Rod Hangers: 3/16 inch diameter cadmium plated, threaded steel rod.

## 2.4 FLUORESCENT FIXTURES

- A. Electronic Ballast:
- |   |  |
|---|--|
| 1. Ballast to be "UL listed, Class P".  |  |
| 2. Ballast to be "Sound Rated A".   |  |
| 3. Ballast enclosure size shall be same as or smaller than, magnetic ballast. |  |

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4. Light regulation shall be +/- 10% input voltage variation.
  5. Ballast shall have high power factor (minimum of 90%).
  6. Lamp current crest factor shall be equal to, or less than, 1.7.
  7. Input current third harmonics shall not exceed ANSI recommendations (32% total harmonic distortion, 27.5% of the third triplets).
  8. Flicker shall be 15% or less with any lamp suitable for the ballast.
  9. Ballast design shall withstand line transients per IEEE 587, Category A.
  10. Ballast case temperature shall not exceed 25 degrees C rise over 40 degrees C ambient.
  11. Ballast shall meet FCC Rules and Regulations, Part 18.
  12. Parallel wiring between the ballast and fixture is recommended.
  13. Minimum of five (5) years warranty is required with each electronic ballast.
  14. The manufacturer shall have not less than 5 years of experience in manufacturing electronic ballast.
- B. Provide disconnecting means per NEC 410.130 G.
- C. Low Temperature Ballast Minimum Starting Temperature: Minus 20 degrees C
- D. Where compact fluorescent light fixtures are specified, "High Power Factor" electronic ballast shall be standard.

## 2.5 FLUORESCENT LAMPS

- A. All fluorescent lamps to be {41} K-rated unless noted otherwise.

## 2.6 EXIT SIGNS

- A. Conform to UL 924, "Emergency Lighting and Power Equipment".
1. Arrows: Include as indicated.
- B. Emergency Exit Signs shall be of the "LED" style.
- C. Units shall be completely self-contained, provided with maintenance-free battery, automatic charger, and other features. Luminaire must be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, NC Building Code, Volume X Energy code, NFPA-101, and NEMA Standards.
- D. BATTERY-It shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Must have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of 0 degree C to 60 degrees C and contain a resealable pressure vent, a sintered + positive and - negative terminal.
- E. CHARGER- It shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80%. A low voltage disconnect switch shall be included if LEAD

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battery is used to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.

- F. ADDITIONAL FEATURES- Pilot light to indicate the unit is connected to AC power. The battery shall have rate discharge pilot light, unless self-diagnostic type. Test switch to simulate the operation of the unit upon loss of AC power by energizing the lamps from the battery. This simulation must also exercise the transfer relay.
- G. WARRANTY-The entire unit shall be warranted for 3 years. The battery must have an additional 2 more years pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.
- H. LED-The use of LED is required due to their reliable performance, low power consumption, and limited maintenance requirements. Maximum LED failure rate shall be 25% within a seven (7) year period; otherwise, if exceeded, manufacturer shall replace the complete unit at no charge to the owner.

## 2.7 EMERGENCY LIGHTING UNITS

- A. Conform to UL 924, "Emergency Lighting and Power Equipment" requirements for "Unit Equipment". Provide self-contained units with the following features and additional characteristics as indicated.
- B. Units shall be completely self-contained, provided with maintenance-free battery, automatic charger, and other features. Luminaire must be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, NC Building Code, Volume X Energy code, NFPA-101, and NEMA Standards.
- C. BATTERY-It shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Must have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of 0 degree C to 60 degrees C and contain a resealable pressure vent, a sintered + positive and – negative terminal.
- D. CHARGER- It shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80%. A low voltage disconnect switch shall be included if LEAD battery is used to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.
- E. ADDITIONAL FEATURES- Pilot light to indicate the unit is connected to AC power. The battery shall have rate discharge pilot light, unless self-diagnostic type. Test switch to simulate the operation of the unit upon loss of AC power by energizing the lamps from the battery. This simulation must also exercise the transfer relay.
- F. WARRANTY-The entire unit shall be warranted for 3 years. The battery must have an additional 2 more years pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.

## 2.8 FINISH

- A. Steel Parts: Manufacturer's standard finish applied over corrosion-resistant primer, free of streaks, runs, holidays, stains, blisters, and defects. Remove fixtures showing evidence of corrosion during project warranty period and replace with new fixtures.
- B. Paint parts after fabrication.

## PART III – EXECUTION



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## 3.1 INSTALLATION

- A. Setting and Securing: Set units plumb, square, and level with ceiling and walls, and secure according to manufacturer's printed instructions and approved Shop Drawings.
- B. Support For Recessed and Semi-Recessed Fixtures: Units shall be supported independent from suspended ceiling. Install fixture with support wires at 2 diagonal corners to the structure or building steel.
  - 1. Fixtures of Sizes Less Than Ceiling Grid: Center in the acoustical panel. Support fixtures independently with at least two  $\frac{3}{4}$  inch metal channels spanning and secured to the ceiling tees.
  - 2. Install support clips or screws for recessed fixtures, securely fastened to ceiling grid members, at or near each fixture corners.
  - 3. Support wires shall be not less than the support wires for the ceiling system.
- C. Support for Suspended Fixtures: Brace pendants and rods that are 4 feet long or longer to limit swinging. Support stem mounted single unit suspended fluorescent fixtures with twin stem hangers. For continuous rows, use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of chassis, including one at each end.
- D. Lamping: See Schedule on Drawings, or provide standard lamp for the rating of the fixture.
- E. Where mounting height for fixtures are not scheduled, coordinate with the Engineer before any installation.

## 3.2 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Emergency Battery Units Test: Verify normal operation of each fixture after fixtures have been installed and circuits have been energized with normal power source. Interrupt electrical energy for a period of not less than 90 minutes to demonstrate proper operation of Emergency Lighting installation. Include the following in tests of emergency lighting equipment.
  - 1. Duration of supply
  - 2. Low battery voltage shut-down
  - 3. Normal transfer to battery source and retransfer to normal
  - 4. Low supply voltage transfer
- C. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.
- D. Contractor shall perform a test on each unit after it is permanently installed and charged for a minimum of 24 hours. Battery shall be tested for 90 minutes. The battery test shall be done 10 days prior to final inspection by the State Construction Office. Any unit which fails the test must be repaired or replaced and tested again. Copy of the test report shall be sent to the State Construction Office.

## 3.3 ADJUSTING AND CLEANING

- A. Clean fixtures upon completion of installation. Use methods and materials recommended by manufacturer.

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- B. Adjust aimable fixtures to provide required light intensities.

END OF SECTION 16515

**STANDARD SPECIAL PROVISION**  
**AVAILABILITY OF FUNDS – TERMINATION OF CONTRACTS**

(5-20-08)

Z-2

*General Statute 143C-6-11. (h) Highway Appropriation* is hereby incorporated verbatim in this contract as follows:

(h) Amounts Encumbered. – Transportation project appropriations may be encumbered in the amount of allotments made to the Department of Transportation by the Director for the estimated payments for transportation project contract work to be performed in the appropriation fiscal year. The allotments shall be multiyear allotments and shall be based on estimated revenues and shall be subject to the maximum contract authority contained in *General Statute 143C-6-11(c)*. Payment for transportation project work performed pursuant to contract in any fiscal year other than the current fiscal year is subject to appropriations by the General Assembly. Transportation project contracts shall contain a schedule of estimated completion progress, and any acceleration of this progress shall be subject to the approval of the Department of Transportation provided funds are available. The State reserves the right to terminate or suspend any transportation project contract, and any transportation project contract shall be so terminated or suspended if funds will not be available for payment of the work to be performed during that fiscal year pursuant to the contract. In the event of termination of any contract, the contractor shall be given a written notice of termination at least 60 days before completion of scheduled work for which funds are available. In the event of termination, the contractor shall be paid for the work already performed in accordance with the contract specifications.

Payment will be made on any contract terminated pursuant to the special provision in accordance with Subarticle 108-13(E) of the *2012 Standard Specifications*.

**STANDARD SPECIAL PROVISION**  
**NCDOT GENERAL SEED SPECIFICATION FOR SEED QUALITY**

(5-17-11)

Z-3

Seed shall be sampled and tested by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory. When said samples are collected, the vendor shall supply an independent laboratory report for each lot to be tested. Results from seed so sampled shall be final. Seed not meeting the specifications shall be rejected by the Department of Transportation and shall not be delivered to North Carolina Department of Transportation warehouses. If seed has been delivered it shall be available for pickup and replacement at the supplier's expense.

Any re-labeling required by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory, that would cause the label to reflect as otherwise specified herein shall be rejected by the North Carolina Department of Transportation.

Seed shall be free from seeds of the noxious weeds Johnsongrass, Balloonvine, Jimsonweed, Witchweed, Itchgrass, Serrated Tussock, Showy Crotalaria, Smooth Crotalaria, Sicklepod, Sandbur, Wild Onion, and Wild Garlic. Seed shall not be labeled with the above weed species on the seed analysis label. Tolerances as applied by the Association of Official Seed Analysts will NOT be allowed for the above noxious weeds except for Wild Onion and Wild Garlic.

Tolerances established by the Association of Official Seed Analysts will generally be recognized. However, for the purpose of figuring pure live seed, the found pure seed and found germination percentages as reported by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory will be used. Allowances, as established by the NCDOT, will be recognized for minimum pure live seed as listed on the following pages.

The specifications for restricted noxious weed seed refers to the number per pound as follows:

<b><u>Restricted Noxious Weed</u></b>	<b><u>Limitations per Lb. Of Seed</u></b>	<b><u>Restricted Noxious Weed</u></b>	<b><u>Limitations per Lb. of Seed</u></b>
Blessed Thistle	4 seeds	Cornflower (Ragged Robin)	27 seeds
Cocklebur	4 seeds	Texas Panicum	27 seeds
Spurred Anoda	4 seeds	Bracted Plantain	54 seeds
Velvetleaf	4 seeds	Buckhorn Plantain	54 seeds
Morning-glory	8 seeds	Broadleaf Dock	54 seeds
Corn Cockle	10 seeds	Curly Dock	54 seeds
Wild Radish	12 seeds	Dodder	54 seeds
Purple Nutsedge	27 seeds	Giant Foxtail	54 seeds
Yellow Nutsedge	27 seeds	Horsenettle	54 seeds
Canada Thistle	27 seeds	Quackgrass	54 seeds
Field Bindweed	27 seeds	Wild Mustard	54 seeds
Hedge Bindweed	27 seeds		

Seed of Pensacola Bahiagrass shall not contain more than 7% inert matter, Kentucky Bluegrass, Centipede and Fine or Hard Fescue shall not contain more than 5% inert matter whereas a maximum of 2% inert matter will be allowed on all other kinds of seed. In addition, all seed shall not contain more than 2% other crop seed nor more than 1% total weed seed. The germination rate as tested by the North Carolina Department of Agriculture shall not fall below 70%, which includes both dormant and hard seed. Seed shall be labeled with not more than 7%, 5% or 2% inert matter (according to above specifications), 2% other crop seed and 1% total weed seed.

Exceptions may be made for minimum pure live seed allowances when cases of seed variety shortages are verified. Pure live seed percentages will be applied in a verified shortage situation. Those purchase orders of deficient seed lots will be credited with the percentage that the seed is deficient.

FURTHER SPECIFICATIONS FOR EACH SEED GROUP ARE GIVEN BELOW:

Minimum 85% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 83% pure live seed will not be approved.

Sericea Lespedeza  
Oats (seeds)

Minimum 80% pure live seed; maximum 1% total weed seed; maximum 2% total other crop; maximum 144 restricted noxious weed seed per pound. Seed less than 78% pure live seed will not be approved.

Tall Fescue (all approved varieties)	Bermudagrass
Kobe Lespedeza	Browntop Millet
Korean Lespedeza	German Millet – Strain R
Weeping Lovegrass	Clover – Red/White/Crimson
Carpetgrass	

Minimum 78% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 76% pure live seed will not be approved.

Common or Sweet Sundangrass

Minimum 76% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 74% pure live seed will not be approved.

Rye (grain; all varieties)  
Kentucky Bluegrass (all approved varieties)  
Hard Fescue (all approved varieties)  
Shrub (bicolor) Lespedeza

Minimum 70% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 noxious weed seed per pound. Seed less than 70% pure live seed will not be approved.

Centipedegrass	Japanese Millet
Crownvetch	Reed Canary Grass
Pensacola Bahiagrass	Zoysia
Creeping Red Fescue	

Minimum 70% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 5% inert matter; maximum 144 restricted noxious weed seed per pound.

Barnyard Grass  
Big Bluestem  
Little Bluestem  
Bristly Locust  
Birdsfoot Trefoil  
Indiangrass  
Orchardgrass  
Switchgrass  
Yellow Blossom Sweet Clover

**STANDARD SPECIAL PROVISION****ERRATA**

(1-17-12) (Rev. 04-21-15)

Z-4

Revise the *2012 Standard Specifications* as follows:

**Division 2**

**Page 2-7, line 31, Article 215-2 Construction Methods**, replace “Article 107-26” with “Article 107-25”.

**Page 2-17, Article 226-3, Measurement and Payment, line 2**, delete “pipe culverts.”.

**Page 2-20, Subarticle 230-4(B), Contractor Furnished Sources, change references as follows: Line 1**, replace “(4) Buffer Zone” with “(c) Buffer Zone”; **Line 12**, replace “(5) Evaluation for Potential Wetlands and Endangered Species” with “(d) Evaluation for Potential Wetlands and Endangered Species”; and **Line 33**, replace “(6) Approval” with “(4) Approval”.

**Division 3**

**Page 3-1, after line 15, Article 300-2 Materials**, replace “1032-9(F)” with “1032-6(F)”.

**Division 4**

**Page 4-77, line 27, Subarticle 452-3(C) Concrete Coping**, replace “sheet pile” with “reinforcement”.

**Division 6**

**Page 6-7, line 31, Article 609-3 Field Verification of Mixture and Job Mix Formula Adjustments**, replace “30” with “45”.

**Page 6-10, line 42, Subarticle 609-6(C)(2)**, replace “Subarticle 609-6(E)” with “Subarticle 609-6(D)”.

**Page 6-11, Table 609-1 Control Limits**, replace “Max. Spec. Limit” for the Target Source of  $P_{0.075}/P_{be}$  Ratio with “1.0”.

**Page 6-40, Article 650-2 Materials**, replace “Subarticle 1012-1(F)” with “Subarticle 1012-1(E)”

**Division 7**

**Page 7-1, Article 700-3, CONCRETE HAULING EQUIPMENT**, line 33, replace “competition” with “completion”.

**Division 8**

**Page 8-23, line 10, Article 838-2 Materials**, replace “Portland Cement Concrete, Class B” with “Portland Cement Concrete, Class A”.

**Division 10**

**Page 10-166, Article 1081-3 Hot Bitumen**, replace “Table 1081-16” with “Table 1081-2”, replace “Table 1081-17” with “Table 1081-3”, and replace “Table 1081-18” with “Table 1081-4”.

**Division 12**

**Page 12-7, Table 1205-3**, add “FOR THERMOPLASTIC” to the end of the title.

**Page 12-8, Subarticle 1205-5(B), line 13**, replace “Table 1205-2” with “Table 1205-4”.

**Page 12-8, Table 1205-4 and 1205-5**, replace “THERMOPLASTIC” in the title of these tables with “POLYUREA”.

**Page 12-9, Subarticle 1205-6(B), line 21**, replace “Table 1205-4” with “Table 1205-6”.

**Page 12-11, Subarticle 1205-8(C), line 25**, replace “Table 1205-5” with “Table 1205-7”.

**Division 15**

**Page 15-4, Subarticle 1505-3(F) Backfilling, line 26,** replace “Subarticle 235-4(C)” with “Subarticle 235-3(C)”.

**Page 15-6, Subarticle 1510-3(B), after line 21,** replace the allowable leakage formula with the following:  
 **$W=LD\sqrt{P} \div 148,000$**

**Page 15-6, Subarticle 1510-3(B), line 32,** delete “may be performed concurrently or” and replace with “shall be performed”.

**Page 15-17, Subarticle 1540-3(E), line 27,** delete “Type 1”.

**Division 17**

**Page 17-26, line 42, Subarticle 1731-3(D) Termination and Splicing within Interconnect Center,** delete this subarticle.

Revise the *2012 Roadway Standard Drawings* as follows:

**1633.01 Sheet 1 of 1, English Standard Drawing for Matting Installation,** replace “1633.01” with “1631.01”.

**STANDARD SPECIAL PROVISION****PLANT AND PEST QUARANTINES****(Imported Fire Ant, Gypsy Moth, Witchweed, Emerald Ash Borer, And Other Noxious Weeds)**

(3-18-03) (Rev. 12-20-16)

Z-04a

**Within Quarantined Area**

This project may be within a county regulated for plant and/or pests. If the project or any part of the Contractor's operations is located within a quarantined area, thoroughly clean all equipment prior to moving out of the quarantined area. Comply with federal/state regulations by obtaining a certificate or limited permit for any regulated article moving from the quarantined area.

**Originating in a Quarantined County**

Obtain a certificate or limited permit issued by the N.C. Department of Agriculture/United States Department of Agriculture. Have the certificate or limited permit accompany the article when it arrives at the project site.

**Contact**

Contact the N.C. Department of Agriculture/United States Department of Agriculture at 1-800-206-9333, 919-707-3730, or <http://www.ncagr.gov/plantindustry/> to determine those specific project sites located in the quarantined area or for any regulated article used on this project originating in a quarantined county.

**Regulated Articles Include**

1. Soil, sand, gravel, compost, peat, humus, muck, and decomposed manure, separately or with other articles. This includes movement of articles listed above that may be associated with cut/waste, ditch pulling, and shoulder cutting.
2. Plants with roots including grass sod.
3. Plant crowns and roots.
4. Bulbs, corms, rhizomes, and tubers of ornamental plants.
5. Hay, straw, fodder, and plant litter of any kind.
6. Clearing and grubbing debris.
7. Used agricultural cultivating and harvesting equipment.
8. Used earth-moving equipment.
9. Any other products, articles, or means of conveyance, of any character, if determined by an inspector to present a hazard of spreading imported fire ant, gypsy moth, witchweed, emerald ash borer, or other noxious weeds.



**STANDARD SPECIAL PROVISION****MINIMUM WAGES**

(7-21-09)

Z-5

**FEDERAL:** The Fair Labor Standards Act provides that with certain exceptions every employer shall pay wages at the rate of not less than SEVEN DOLLARS AND TWENTY FIVE CENTS (\$7.25) per hour.

**STATE:** The North Carolina Minimum Wage Act provides that every employer shall pay to each of his employees, wages at a rate of not less than SEVEN DOLLARS AND TWENTY FIVE CENTS (\$7.25) per hour.

The minimum wage paid to all skilled labor employed on this contract shall be SEVEN DOLLARS AND TWENTY FIVE CENTS (\$7.25) per hour.

The minimum wage paid to all intermediate labor employed on this contract shall be SEVEN DOLLARS AND TWENTY FIVE CENTS (\$7.25) per hour.

The minimum wage paid to all unskilled labor on this contract shall be SEVEN DOLLARS AND TWENTY FIVE CENTS (\$7.25) per hour.

This determination of the intent of the application of this act to the contract on this project is the responsibility of the Contractor.

The Contractor shall have no claim against the Department of Transportation for any changes in the minimum wage laws, Federal or State. It is the responsibility of the Contractor to keep fully informed of all Federal and State Laws affecting his contract.

## STANDARD SPECIAL PROVISION

### AWARD OF CONTRACT

(6-28-77)(Rev 2/16/2016)

Z-6

“The North Carolina Department of Transportation, in accordance with the provisions of *Title VI of the Civil Rights Act of 1964* (78 Stat. 252) and the Regulations of the Department of Transportation (*49 C.F.R., Part 21*), issued pursuant to such act, hereby notifies all bidders that it will affirmatively insure that the contract entered into pursuant to this advertisement will be awarded to the lowest responsible bidder without discrimination on the ground of race, color, or national origin”.

## TITLE VI AND NONDISCRIMINATION

### **I. Title VI Assurance**

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

**(1) Compliance with Regulations:** The contractor shall comply with the Regulation relative to nondiscrimination in Federally-assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

**(2) Nondiscrimination:** The Contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

**(3) Solicitations for Subcontractors, Including Procurements of Materials and Equipment:** In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

**(4) Information and Reports:** The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the North Carolina Department of Transportation (NCDOT) or the Federal Highway Administration (FHWA) to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information the contractor shall so certify to the NCDOT, or the FHWA as appropriate, and shall set forth what efforts it has made to obtain the information.

**(5) Sanctions for Noncompliance:** In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the NCDOT shall impose such contract sanctions as it or the FHWA may determine to be appropriate, including, but not limited to:

- (a) Withholding of payments to the contractor under the contract until the contractor complies, and/or
- (b) Cancellation, termination or suspension of the contract, in whole or in part.

**(6) Incorporation of Provisions:** The contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto.

The contractor shall take such action with respect to any subcontractor procurement as the NCDOT or the FHWA may direct as a means of enforcing such provisions including sanctions for noncompliance: provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the NCDOT to enter into such

litigation to protect the interests of the NCDOT, and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

## **II. Title VI Nondiscrimination Program**

Title VI of the 1964 Civil Rights Act, 42 U.S.C. 2000d, provides that: “No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.” The broader application of nondiscrimination law is found in other statutes, executive orders, and regulations (see Section III, Pertinent Nondiscrimination Authorities), which provide additional protections based on age, sex, disability and religion. In addition, the 1987 Civil Rights Restoration Act extends nondiscrimination coverage to all programs and activities of federal-aid recipients and contractors, including those that are not federally-funded.

### *Nondiscrimination Assurance*

The North Carolina Department of Transportation (NCDOT) hereby gives assurance that no person shall on the ground of race, color, national origin, sex, age, and disability, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity conducted by the recipient, as provided by Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987, and any other related Civil Rights authorities, whether those programs and activities are federally funded or not.

### *Obligation*

During the performance of this contract, the Contractor and its subcontractors are responsible for complying with NCDOT’s Title VI Program. The Contractor must ensure that NCDOT’s Notice of Nondiscrimination is posted in conspicuous locations accessible to all employees and subcontractors on the jobsite, along with the Contractor’s own Equal Employment Opportunity (EEO) Policy Statement. The Contractor shall physically incorporate this “**TITLE VI AND NONDISCRIMINATION**” language, in its entirety, into all its subcontracts on federally-assisted and state-funded NCDOT-owned projects, and ensure its inclusion by subcontractors into all subsequent lower tier subcontracts. The Contractor and its subcontractors shall also physically incorporate the **FHWA-1273**, in its entirety, into all subcontracts and subsequent lower tier subcontracts on Federal-aid highway construction contracts only. The Contractor is also responsible for making its subcontractors aware of NCDOT’s Discrimination Complaints Process, as follows:

## **FILING OF COMPLAINTS**

1. **Applicability** – These complaint procedures apply to the beneficiaries of the NCDOT’s programs, activities, and services, including, but not limited to, members of the public, contractors, subcontractors, consultants, and other sub-recipients of federal and state funds.
2. **Eligibility** – Any person or class of persons who believes he/she has been subjected to discrimination or retaliation prohibited by any of the Civil Rights authorities, based upon race, color, sex, age, national origin, or disability, may file a written complaint with NCDOT’s Civil Rights office. The law prohibits intimidation or retaliation of any sort. The complaint may be filed by the affected individual or a representative, and must be in writing.
3. **Time Limits and Filing Options** – A complaint must be filed no later than 180 calendar days after the following:
  - The date of the alleged act of discrimination; or
  - The date when the person(s) became aware of the alleged discrimination; or
  - Where there has been a continuing course of conduct, the date on which that conduct was discontinued or the latest instance of the conduct.

Title VI and other discrimination complaints may be submitted to the following entities:

- **North Carolina Department of Transportation**, Office of Equal Opportunity & Workforce Services (EOWS), External Civil Rights Section, 1511 Mail Service Center, Raleigh, NC 27699-1511; 919-508-1808 or toll free 800-522-0453
- **US Department of Transportation**, Departmental Office of Civil Rights, External Civil Rights Programs Division, 1200 New Jersey Avenue, SE, Washington, DC 20590; 202-366-4070

**Federal Highway Administration**, North Carolina Division Office, 310 New Bern Avenue, Suite 410, Raleigh, NC 27601, 919-747-7010

**Federal Highway Administration**, Office of Civil Rights, 1200 New Jersey Avenue, SE, 8<sup>th</sup> Floor, E81-314, Washington, DC 20590, 202-366-0693 / 366-0752

**Federal Transit Administration**, Office of Civil Rights, ATTN: Title VI Program Coordinator, East Bldg. 5<sup>th</sup> Floor – TCR, 1200 New Jersey Avenue, SE, Washington, DC 20590

**Federal Aviation Administration**, Office of Civil Rights, 800 Independence Avenue, SW, Washington, DC 20591, 202-267-3258

➤ **US Department of Justice**, Special Litigation Section, Civil Rights Division, 950 Pennsylvania Avenue, NW, Washington, DC 20530, 202-514-6255 or toll free 877-218-5228

4. **Format for Complaints** – Complaints must be in **writing** and **signed** by the complainant(s) or a representative and include the complainant’s name, address, and telephone number. Complaints received by fax or e-mail will be acknowledged and processed. Allegations received by telephone will be reduced to writing and provided to the complainant for confirmation or revision before processing. Complaints will be accepted in other languages including Braille.
5. **Discrimination Complaint Form** – Contact NCDOT EOWS at the phone number above to receive a full copy of the Discrimination Complaint Form and procedures.
6. **Complaint Basis** – Allegations must be based on issues involving race, color, national origin, sex, age, or disability. The term “basis” refers to the complainant’s membership in a protected group category. Contact this office to receive a Discrimination Complaint Form.

Protected Categories	Definition	Examples	Applicable Statutes and Regulations	
			FHWA	FTA
Race	An individual belonging to one of the accepted racial groups; or the perception, based usually on physical characteristics that a person is a member of a racial group	Black/African American, Hispanic/Latino, Asian, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, White	Title VI of the Civil Rights Act of 1964; 49 CFR Part 21; 23 CFR 200	Title VI of the Civil Rights Act of 1964; 49 CFR Part 21; Circular 4702.1B
Color	Color of skin, including shade of skin within a racial group	Black, White, brown, yellow, etc.		
National Origin	Place of birth. Citizenship is not a factor. Discrimination based on language or a person’s accent is also covered.	Mexican, Cuban, Japanese, Vietnamese, Chinese		
Sex	Gender	Women and Men	1973 Federal-Aid Highway Act	Title IX of the Education Amendments of 1972
Age	Persons of any age	21 year old person	Age Discrimination Act of 1975	
Disability	Physical or mental impairment, permanent or temporary, or perceived.	Blind, alcoholic, paraplegic, epileptic, diabetic, arthritic	Section 504 of the Rehabilitation Act of 1973; Americans with Disabilities Act of 1990	

### **III. Pertinent Nondiscrimination Authorities**

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest agrees to comply with the following non-discrimination statutes and authorities, including, but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 *et seq.*), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq.*), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq.*), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms “programs or activities” to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration’s Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 *et seq.*).
- Title VII of the Civil Rights Act of 1964 (42 U.S.C. § 2000e *et seq.*, Pub. L. 88-352), (prohibits employment discrimination on the basis of race, color, religion, sex, or national origin);
- 49 CFR Part 26, regulation to ensure nondiscrimination in the award and administration of DOT-assisted contracts in the Department's highway, transit, and airport financial assistance programs, as regards the use of Disadvantaged Business Enterprises (DBEs);
- Form FHWA-1273, “Required Contract Provisions,” a collection of contract provisions and proposal notices that are generally applicable to *all Federal-aid construction projects* and must be made a part of, and physically incorporated into, *all federally-assisted contracts*, as well as appropriate subcontracts and purchase orders, particularly Sections II (Nondiscrimination) and III (Nonsegregated Facilities).

## STANDARD SPECIAL PROVISION

### ON-THE-JOB TRAINING

(10-16-07) (Rev. 4-21-15)

Z-10

#### **Description**

The North Carolina Department of Transportation will administer a custom version of the Federal On-the-Job Training (OJT) Program, commonly referred to as the Alternate OJT Program. All contractors (existing and newcomers) will be automatically placed in the Alternate Program. Standard OJT requirements typically associated with individual projects will no longer be applied at the project level. Instead, these requirements will be applicable on an annual basis for each contractor administered by the OJT Program Manager.

On the Job Training shall meet the requirements of 23 CFR 230.107 (b), 23 USC – Section 140, this provision and the On-the-Job Training Program Manual.

The Alternate OJT Program will allow a contractor to train employees on Federal, State and privately funded projects located in North Carolina. However, priority shall be given to training employees on NCDOT Federal-Aid funded projects.

#### **Minorities and Women**

Developing, training and upgrading of minorities and women toward journeyman level status is a primary objective of this special training provision. Accordingly, the Contractor shall make every effort to enroll minority and women as trainees to the extent that such persons are available within a reasonable area of recruitment. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

#### **Assigning Training Goals**

The Department, through the OJT Program Manager, will assign training goals for a calendar year based on the contractors' past three years' activity and the contractors' anticipated upcoming year's activity with the Department. At the beginning of each year, all contractors eligible will be contacted by the Department to determine the number of trainees that will be assigned for the upcoming calendar year. At that time the Contractor shall enter into an agreement with the Department to provide a self-imposed on-the-job training program for the calendar year. This agreement will include a specific number of annual training goals agreed to by both parties. The number of training assignments may range from 1 to 15 per contractor per calendar year. The Contractor shall sign an agreement to fulfill their annual goal for the year.

#### **Training Classifications**

The Contractor shall provide on-the-job training aimed at developing full journeyman level workers in the construction craft/operator positions. Preference shall be given to providing training in the following skilled work classifications:

Equipment Operators	Office Engineers
Truck Drivers	Estimators
Carpenters	Iron / Reinforcing Steel Workers
Concrete Finishers	Mechanics
Pipe Layers	Welders

The Department has established common training classifications and their respective training requirements that may be used by the contractors. However, the classifications established are not all-inclusive. Where the training is oriented toward construction applications, training will be allowed in lower-level management positions such as office engineers and estimators. Contractors shall submit new classifications for specific job functions that their employees are performing. The Department will review and recommend for acceptance to FHWA the new classifications proposed by contractors, if applicable. New classifications shall meet the following requirements:

Proposed training classifications are reasonable and realistic based on the job skill classification needs, and

The number of training hours specified in the training classification is consistent with common practices and provides enough time for the trainee to obtain journeyman level status.

The Contractor may allow trainees to be trained by a subcontractor provided that the Contractor retains primary responsibility for meeting the training and this provision is made applicable to the subcontract. However, only the Contractor will receive credit towards the annual goal for the trainee.

Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. The number of trainees shall be distributed among the work classifications on the basis of the contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment.

No employee shall be employed as a trainee in any classification in which they have successfully completed a training course leading to journeyman level status or in which they have been employed as a journeyman.

### **Records and Reports**

The Contractor shall maintain enrollment, monthly and completion reports documenting company compliance under these contract documents. These documents and any other information as requested shall be submitted to the OJT Program Manager.

Upon completion and graduation of the program, the Contractor shall provide each trainee with a certification Certificate showing the type and length of training satisfactorily completed.

### **Trainee Interviews**

All trainees enrolled in the program will receive an initial and Trainee/Post graduate interview conducted by the OJT program staff.

### **Trainee Wages**

Contractors shall compensate trainees on a graduating pay scale based upon a percentage of the prevailing minimum journeyman wages (Davis-Bacon Act). Minimum pay shall be as follows:

60 percent	of the journeyman wage for the first half of the training period
75 percent	of the journeyman wage for the third quarter of the training period
90 percent	of the journeyman wage for the last quarter of the training period

In no instance shall a trainee be paid less than the local minimum wage. The Contractor shall adhere to the minimum hourly wage rate that will satisfy both the NC Department of Labor (NCDOL) and the Department.

**Achieving or Failing to Meet Training Goals**

The Contractor will be credited for each trainee employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and who receives training for at least 50 percent of the specific program requirement. Trainees will be allowed to be transferred between projects if required by the Contractor's scheduled workload to meet training goals.

If a contractor fails to attain their training assignments for the calendar year, they may be taken off the NCDOT's Bidders List.

**Measurement and Payment**

No compensation will be made for providing required training in accordance with these contract documents.



**STANDARD SPECIAL PROVISION****NAME CHANGE FOR NCDENR**

(1-19-16)

Z-11

**Description**

Wherever in the 2012 Standard Specifications, Project Special Provisions, Standard Special Provisions, Permits or Plans that reference is made to “NCDENR” or “North Carolina Department of Environment and Natural Resources”, replace with “NCDEQ” or “North Carolina Department of Environmental Quality” respectively, as the case may be.

**LISTING OF MBE/WBE SUBCONTRACTORS**

Sheet \_\_\_\_\_ of \_\_\_\_\_

Firm Name and Address	Circle One	Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
<b>Name</b>  Address	MBE  WBE				
<b>Name</b>  Address	MBE  WBE				
<b>Name</b>  Address	MBE  WBE				
<b>Name</b>  Address	MBE  WBE				
<b>Name</b>  Address	MBE  WBE				
<b>Name</b>  Address	MBE  WBE				

\* The Dollar Volume shown in this column shall be the Actual Price Agreed Upon by the Prime Contractor and the MBE/WBE subcontractor, and these prices will be used to determine the percentage of the MBE/WBE participation in the contract.

\*\* Dollar Volume of MBE/WBE Subcontractor Percentage of Total Contract Bid Price:

*If firm is a Material Supplier Only, show Dollar Volume as 60% of Agreed Upon Amount from Letter of Intent.*

*If firm is a Manufacturer, show Dollar Volume as 100% of Agreed Upon Amount from Letter of Intent.*

**LISTING OF MBE/WBE SUBCONTRACTORS**

Sheet \_\_\_\_\_ of \_\_\_\_\_

Firm Name and Address	Circle One	Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
Name  Address	MBE  WBE				
Name  Address	MBE  WBE				
Name  Address	MBE  WBE				
Name  Address	MBE  WBE				
Name  Address	MBE  WBE				

**\*\* Dollar Volume of MBE Subcontractor \$ \_\_\_\_\_**

**MBE Percentage of Total Contract Bid Price \_\_\_\_\_%**

**\*\* Dollar Volume of WBE Subcontractor \$ \_\_\_\_\_**

**WBE Percentage of Total Contract Bid Price \_\_\_\_\_%**

**\*The Dollar Volume shown in this column shall be the Actual Price Agreed Upon by the Prime Contractor and the MBE/WBE subcontractor, and these prices will be used to determine the percentage of the MBE/WBE participation in the contract.**

**\*\* Dollar Volume of MBE/WBE Subcontractor Percentage of Total Contract Bid Price.**

**If firm is a Material Supplier Only, show Dollar Volume as 60% of Agreed Upon Amount from Letter of Intent.**

**If firm is a Manufacturer, show Dollar Volume as 100% of Agreed Upon Amount from Letter of Intent.**

**ADDENDUM(S)**

ADDENDUM #1

I, \_\_\_\_\_  
(SIGNATURE)

representing \_\_\_\_\_

Acknowledge receipt of Addendum #1.

ADDENDUM #2

I, \_\_\_\_\_  
(SIGNATURE)

representing \_\_\_\_\_

Acknowledge receipt of Addendum #2.

ADDENDUM #3

I, \_\_\_\_\_  
(SIGNATURE)

representing \_\_\_\_\_

Acknowledge receipt of Addendum #3.

**EXECUTION OF BID  
 NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN  
 CERTIFICATION  
 CORPORATION**

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

*N.C.G.S. § 133-32* and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

**SIGNATURE OF CONTRACTOR**

\_\_\_\_\_ Full name of Corporation

\_\_\_\_\_ Address as Prequalified

Attest \_\_\_\_\_ By \_\_\_\_\_  
 Secretary/Assistant Secretary President/Vice President/Assistant Vice President  
*Select appropriate title Select appropriate title*

\_\_\_\_\_ Print or type Signer's name

\_\_\_\_\_ Print or type Signer's name

**CORPORATE SEAL**

**AFFIDAVIT MUST BE NOTARIZED**

Subscribed and sworn to before me this the  
 \_\_\_\_ day of \_\_\_\_\_ 20\_\_.

**NOTARY SEAL**

\_\_\_\_\_ Signature of Notary Public

of \_\_\_\_\_ County

State of \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

**EXECUTION OF BID  
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN  
CERTIFICATION**

**PARTNERSHIP**

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

*N.C.G.S. § 133-32* and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

**SIGNATURE OF CONTRACTOR**

By

\_\_\_\_\_  
Signature of Witness

\_\_\_\_\_  
Signature of Partner

\_\_\_\_\_  
Print or type Signer's name

\_\_\_\_\_  
Print or type Signer's name

**AFFIDAVIT MUST BE NOTARIZED**

Subscribed and sworn to before me this the \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_.

**NOTARY SEAL**

\_\_\_\_\_  
Signature of Notary Public

of \_\_\_\_\_ County

State of \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

**EXECUTION OF BID  
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN  
CERTIFICATION**

**LIMITED LIABILITY COMPANY**

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

*N.C.G.S. § 133-32* and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

**SIGNATURE OF CONTRACTOR**

\_\_\_\_\_  
Full Name of Firm

\_\_\_\_\_  
Address as Prequalified

\_\_\_\_\_  
Signature of Witness

\_\_\_\_\_  
Signature of Member/Manager/Authorized Agent  
*Select appropriate title*

\_\_\_\_\_  
Print or type Signer's name

\_\_\_\_\_  
Print or type Signer's Name

**AFFIDAVIT MUST BE NOTARIZED**

Subscribed and sworn to before me this the \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_.

**NOTARY SEAL**

\_\_\_\_\_  
Signature of Notary Public

of \_\_\_\_\_ County

State of \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

**EXECUTION OF BID  
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN  
CERTIFICATION**

**JOINT VENTURE (2) or (3)**

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

*N.C.G.S. § 133-32* and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

**SIGNATURE OF CONTRACTOR**

Instructions: **2 Joint Venturers** Fill in lines (1), (2) and (3) and execute. **3 Joint Venturers** Fill in lines (1), (2), (3) and (4) and execute. On Line (1), fill in the name of the Joint Venture Company. On Line (2), fill in the name of one of the joint venturers and execute below in the appropriate manner. On Line (3), print or type the name of the other joint venturer and execute below in the appropriate manner. On Line (4), fill in the name of the third joint venturer, if applicable and execute below in the appropriate manner.

Signature of Witness or Attest	By	Signature of Contractor
Print or type Signer's name		Print or type Signer's name
<i>If Corporation, affix Corporate Seal</i>	and	
Signature of Witness or Attest	By	Signature of Contractor
Print or type Signer's name		Print or type Signer's name
<i>If Corporation, affix Corporate Seal</i>	and	
Signature of Witness or Attest	By	Signature of Contractor
Print or type Signer's name		Print or type Signer's name

*If Corporation, affix Corporate Seal*

**NOTARY SEAL**  
*Affidavit must be notarized for Line (2)*  
 Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

\_\_\_\_\_  
 Signature of Notary Public  
 of \_\_\_\_\_ County  
 State of \_\_\_\_\_  
 My Commission Expires: \_\_\_\_\_

**NOTARY SEAL**  
*Affidavit must be notarized for Line (3)*  
 Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

\_\_\_\_\_  
 Signature of Notary Public  
 of \_\_\_\_\_ County  
 State of \_\_\_\_\_  
 My Commission Expires: \_\_\_\_\_

**NOTARY SEAL**  
*Affidavit must be notarized for Line (4)*  
 Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

\_\_\_\_\_  
 Signature of Notary Public  
 of \_\_\_\_\_ County  
 State of \_\_\_\_\_  
 My Commission Expires: \_\_\_\_\_



**EXECUTION OF BID  
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN  
CERTIFICATION**

**INDIVIDUAL DOING BUSINESS UNDER A FIRM NAME**

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

*N.C.G.S. § 133-32* and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

**SIGNATURE OF CONTRACTOR**

Name of Contractor

\_\_\_\_\_

Individual name

Trading and doing business as

\_\_\_\_\_

Full name of Firm

\_\_\_\_\_  
Signature of Witness

\_\_\_\_\_  
Signature of Contractor, Individually

\_\_\_\_\_  
Print or type Signer's name

\_\_\_\_\_  
Print or type Signer's name

**AFFIDAVIT MUST BE NOTARIZED**

Subscribed and sworn to before me this the

**NOTARY SEAL**

\_\_\_\_\_ day of \_\_\_\_\_ 20\_\_.

\_\_\_\_\_  
Signature of Notary Public

of \_\_\_\_\_ County

State of \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

**EXECUTION OF BID  
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN  
CERTIFICATION**

**INDIVIDUAL DOING BUSINESS IN HIS OWN NAME**

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

*N.C.G.S. § 133-32* and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

**SIGNATURE OF CONTRACTOR**

Name of Contractor \_\_\_\_\_  
Print or type Individual name

\_\_\_\_\_  
Address as Prequalified

\_\_\_\_\_  
Signature of Contractor, Individually

\_\_\_\_\_  
Print or type Signer's Name

\_\_\_\_\_  
Signature of Witness

\_\_\_\_\_  
Print or type Signer's name

**AFFIDAVIT MUST BE NOTARIZED**

Subscribed and sworn to before me this the \_\_\_\_\_  
day of \_\_\_\_\_ 20\_\_.

**NOTARY SEAL**

\_\_\_\_\_  
Signature of Notary Public

of \_\_\_\_\_ County

State of \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

## DEBARMENT CERTIFICATION

### Conditions for certification:

1. The prequalified bidder shall provide immediate written notice to the Department if at any time the bidder learns that his certification was erroneous when he submitted his debarment certification or explanation filed with the Department, or has become erroneous because of changed circumstances.
2. The terms *covered transaction*, *debarred*, *suspended*, *ineligible*, *lower tier covered transaction*, *participant*, *person*, *primary covered transaction*, *principal*, *proposal*, and *voluntarily excluded*, as used in this provision, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. A copy of the Federal Rules requiring this certification and detailing the definitions and coverages may be obtained from the Contract Officer of the Department.
3. The prequalified bidder agrees by submitting this form, that he will not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in NCDOT contracts, unless authorized by the Department.
4. For Federal Aid projects, the prequalified bidder further agrees that by submitting this form he will include the Federal-Aid Provision titled *Required Contract Provisions Federal-Aid Construction Contract (Form FHWA PR 1273)* provided by the Department, without subsequent modification, in all lower tier covered transactions.
5. The prequalified bidder may rely upon a certification of a participant in a lower tier covered transaction that he is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless he knows that the certification is erroneous. The bidder may decide the method and frequency by which he will determine the eligibility of his subcontractors.
6. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this provision. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
7. Except as authorized in paragraph 6 herein, the Department may terminate any contract if the bidder knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available by the Federal Government.

**DEBARMENT CERTIFICATION**

The prequalified bidder certifies to the best of his knowledge and belief, that he and his principals:

- a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records; making false statements; or receiving stolen property;
- c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph b. of this certification; and
- d. Have not within a three-year period preceding this proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
- e. Will submit a revised Debarment Certification immediately if his status changes and will show in his bid proposal an explanation for the change in status.

If the prequalified bidder cannot certify that he is not debarred, he shall provide an explanation with this submittal. An explanation will not necessarily result in denial of participation in a contract.

Failure to submit a non-collusion affidavit and debarment certification will result in the prequalified bidder's bid being considered non-responsive.

Check here if an explanation is attached to this certification.

# North Carolina Department of Transportation BID FORM

**CONTRACT:** 11733797  
**WBS ELEMENTS:** 51213.031  
**COUNTIES:** Carteret County  
**DESCRIPTION:** Carteret County Rest Area Renovation

**BID OPENING: Wednesday, September 27, 2017**

ITEM	SECT	DESCRIPTION	QTY	UNIT	UNIT PRICE	AMOUNT BID
1	SP	GENERAL CONSTRUCTION OF REST AREA BUILDING	1	LS		
2	SP	PLUMBING INSTALLATION OF REST AREA BUILDING	1	LS		
3	SP	MECHANICAL INSTALLATION OF REST AREA BUILDING	1	LS		
4	SP	ELECTRICAL INSTALLATION OF REST AREA BUILDING	1	LS		
5	SP	REMOVE AND REPLACE DAMAGED 2X FLOOR FRAME	300	LF		
6	SP	REMOVE AND REPLACED DAMAGE SUBFLOOR SHEATHING	300	SF		
7	SP	REMOVE AND REPLACE DAMAGED 2X WOOD BOTTOM PLATE	100	LF		
8	SP	REMOVE AND REPLACE DAMAGED 2X WOOD STUD	600	LF		
AA1	SP	ALTERNATE NO. 1 ART WALL-TILE SEE SHEET A1.11	1	LS		
AA2	SP	ALTERNATE NO. 2 ART WALL-TILE SEE SHEET A1.12	1	LS		
AA3	SP	ALTERNATE NO. 3 ART WALL-TILE SEE SHEET A1.12	1	LS		

***TOTAL BID FOR PROJECT:*** \_\_\_\_\_