

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
HIGHWAY DIVISION 14

## PROPOSAL

DATE AND TIME OF BID OPENING: November 15, 2016 AT 2:00 PM

CONTRACT ID: DN00545

WBS ELEMENT NO.: 51213.012

FEDERAL AID NO.: STATE FUNDED

COUNTY: CHEROKEE

TIP NO.: N/A

MILES: N/A

ROUTE NO.: U.S. - 19/74/129

LOCATION: U.S. - 19/74/129 ENTRANCE TO SITE OFF SR-1388- NEAR TOWN  
OF ANDREWS

★ TYPE OF WORK: REST AREA BUILDING RENOVATION / REPLACE DECK/  
RAMP ★

### 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.

THIS IS A ROADWAY PROJECT.

BID BOND IS REQUIRED.

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NAME OF BIDDER

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ADDRESS OF BIDDER

**PROPOSAL FOR THE CONSTRUCTION OF  
CONTRACT No. DN00545 IN CHEROKEE COUNTY, NORTH CAROLINA**

Date \_\_\_\_\_ 20 \_\_\_\_\_

**DEPARTMENT OF TRANSPORTATION,  
RALEIGH, NORTH CAROLINA**

The Bidder has carefully examined the location of the proposed work to be known as Contract No. **DN00545**; 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. **DN00545** in **Cherokee 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.



*Division 14 Contract Officer*

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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. **ALL BIDDERS SHOULD CONTACT THE DIVISION 14 CONTRACTING OFFICE VIA EMAIL D14CONTRACTS@NCDOT.GOV PRIOR TO NOON THE DAY OF LETTING TO RECEIVE A VALIDATION EMAIL. Proposals submitted without the validation email may be rejected.**

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 14 OFFICE, LOCATED AT 253 Webster Road, by 2:00 PM on, November 15, 2016.**

11. The sealed bid must display the following statement on the front of the sealed envelope:

**QUOTATION FOR DN00545 – U.S. - 19/74/129 ENTRANCE TO SITE OFF SR-1388- NEAR TOWN OF ANDREWS, TO BE OPENED AT 2:00 PM on, November 15, 2016.**

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: Jeffrey E. Alspaugh, EI**  
**253 Webster Road**  
**Sylva, NC 28779**

**OPTIONAL COMPUTER BID PREPARATION:**

1. All instructions given above for completing and returning TRADITIONAL PAPER BIDS apply, except as modified by the provision “**Computer Bid Preparation (Optional)**”, if applicable.
2. Expedite software necessary for electronic bid preparation may be downloaded from the Connect NCDOT website at: <https://connect.ncdot.gov/letting/Pages/EBS-Information.aspx>

**MANDATORY PRE-BID CONFERENCE (Prequalifying To Bid):**

(7-18-06) (Rev. 3-25-13)

SPD 1-310

In order for all prospective bidders to have an extensive knowledge of the project, all prospective bidders shall attend a mandatory pre-bid conference at 2:00 P.M., Tuesday, November 8, 2016.

Cherokee Rest Area, along U.S. 19, west of S.R. 1388, in Andrews, NC  
(828) 321-5601

The pre-bid conference will include a thorough discussion of the plans, contract pay items, special provisions, etc.

Only bidders who have attended and properly registered at the above scheduled pre-bid conference and who have met all other prequalification requirements will be considered prequalified to bid on this project. A bid received from a bidder who has not attended and properly registered at the above scheduled pre-bid conference will not be accepted and considered for award.

Attendance at the pre-bid conference will not meet the requirements of proper registration unless the individual attending has registered at the pre-bid conference in accordance with the following:

- (A) The individual has signed his name on the official roster prior to the above noted time for the beginning of the conference.
- (B) The individual has written in the name and address of the company he or she represents.
- (C) Only one company has been shown as being represented by the individual attending.
- (D) The individual attending is an officer or permanent employee of the company they are representing.

Any individual arriving after the official roster has been received by the Engineer will not be eligible to bid. Attendance at any prior pre-bid conference will not meet the requirement of this provision.

**PROJECT SPECIAL PROVISIONS****GENERAL****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.

**CONTRACT TIME AND LIQUIDATED DAMAGES:**

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

108

SP1 G10 A

The date of availability for this contract is **December 15, 2016**.

The completion date for this contract is **April 30, 2017**.

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.

**ELECTRONIC BIDDING (Division Contracts):**

(05-13-16)

102

SP1 G24

The bidder has the option to prepare and submit bids by one of three methods; electronically using the on-line system Bid Express®, electronic bid preparation with manual delivery, or traditional paper 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.

**(A) Electronic On-Line Bids thru Bid Express®**

For preparing and submitting the bid electronically using the on-line system Bid Express®, refer to Article 102-8(B) of the *2012 Standard Specifications*.

Bidders that bid electronically on Raleigh Central-Let projects will need a separate Digital Signature from Bid Express® for Division Contracts.

**(B) Electronic Bid Preparation with Manual Delivery**

For electronic bid preparation with manual delivery, the bidder shall download the Expedite program from the NCDOT "Project Letting" website and download the appropriate .ebs electronic file of line items and quantities unique to each project from the Division Office's website. The only entries into the program which will be permitted by the bidder are the applicable unit or lump sum prices for those items which must be bid in order to provide a complete bid for the project, and any MBE/WBE or DBE participation in the appropriate section of the Expedite program. The computer generated itemized proposal sheets shall be

printed and signed by a duly authorized representative in accordance with Subarticle 102-8(A)(8) of the *2012 Standard Specifications*. The computer generated itemized proposal sheets (.ebs bid file) shall also be copied to an external device (i.e. compact disk (CD), USB flash drive) furnished by the bidder and shall be submitted to the Department with the bid. This set of itemized proposal sheets, MBE/WBE or DBE information, external device and the correct proposal, will constitute the bid and shall be delivered to the contracting Division Office or location specified in the INSTRUCTIONS TO BIDDERS. If the bidder submits their bid on computer generated itemized proposal sheets, bid prices shall not be written on the itemized proposal sheets bound in the proposal.

In the case of discrepancy between the unit or lump sum prices submitted on the itemized proposal sheets and those contained on the CD furnished by the bidder, the unit or lump sum prices submitted on the printed and signed itemized proposal sheets shall prevail. Changes to any entry on the computer generated itemized proposal sheets shall be made in accordance with the requirements of the INSTRUCTIONS TO BIDDERS.

(C) Traditional Paper Bids

Bids may also be submitted by paper means per the INSTRUCTIONS TO BIDDERS.

**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.

**NO SPECIALTY ITEMS:**

(7-1-95)

108-6

SP1 G34

None of the items included in this contract will be specialty items (see Article 108-6 of the *2012 Standard Specifications*).

**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><u>Fiscal Year</u></b>		<b><u>Progress (% of Dollar Value)</u></b>
2017	(7/01/16 - 6/30/17)	<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. 7-19-16)

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.  
<http://www.ncdot.org/doh/forms/files/DBE-IS.xls>

*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 %**

- (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 %**
- (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://partner.ncdot.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 12:00 noon of the sixth calendar day following opening of bids, unless the sixth 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 12:00 noon 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 12:00 noon 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 12:00 noon on the next official state business day.

**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 0 copies of this information shall be received in the office of the Engineer no later than 12:00 noon of the sixth calendar day following opening of bids, unless the sixth 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 12:00 noon 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 NCDOT's Business Development Manager in the Business Opportunity and Work Force Development Unit 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.

### **CONTRACTOR'S LICENSE REQUIREMENTS:**

(7-1-95)

102-14

SP1 G88

If the successful bidder does not hold the proper license to perform any plumbing, heating, air conditioning, or electrical work in this contract, he will be required to sublet such work to a contractor properly licensed in accordance with *Article 2 of Chapter 87 of the General Statutes* (licensing of heating, plumbing, and air conditioning contractors) and *Article 4 of Chapter 87 of the General Statutes* (licensing of electrical contractors).

**SUBSURFACE INFORMATION:**

(7-1-95)

450

SP1 G112 A

There is **no** subsurface information available on this project. The Contractor shall make his own investigation of subsurface conditions.

**LOCATING EXISTING UNDERGROUND UTILITIES:**

(3-20-12)

105

SP1 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.

**TWELVE MONTH GUARANTEE:**

(7-15-03)

108

SP1 G145

- (A) The Contractor shall guarantee materials and workmanship against latent and patent defects arising from faulty materials, faulty workmanship or negligence for a period of twelve months following the date of final acceptance of the work for maintenance and shall replace such defective materials and workmanship without cost to the Department. The Contractor will not be responsible for damage due to faulty design, normal wear and tear, for negligence on the part of the Department, and/or for use in excess of the design.
- (B) Where items of equipment or material carry a manufacturer's guarantee for any period in excess of twelve months, then the manufacturer's guarantee shall apply for that particular piece of equipment or material. The Department's first remedy shall be through the manufacturer although the Contractor is responsible for invoking the warranted repair work with the manufacturer. The Contractor's responsibility shall be limited to the term of the manufacturer's guarantee. NCDOT would be afforded the same warranty as provided by the Manufacturer.

This guarantee provision shall be invoked only for major components of work in which the Contractor would be wholly responsible for under the terms of the contract. Examples would include pavement structures, bridge components, and sign structures. This provision will not be used as a mechanism to force the Contractor to return to the project to make repairs or perform additional work that the Department would normally compensate the Contractor for. In addition, routine maintenance activities (i.e. mowing grass, debris removal, ruts in earth shoulders,) are not parts of this guarantee.

Appropriate provisions of the payment and/or performance bonds shall cover this guarantee for the project.

To ensure uniform application statewide the Division Engineer will forward details regarding the circumstances surrounding any proposed guarantee repairs to the Chief Engineer for review and approval prior to the work being performed.

**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.

**EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION:**

(1-16-07) (Rev 11-22-16)

105-16, 225-2, 16

SP1 G180

**General**

Schedule and conduct construction activities in a manner that will minimize soil erosion and the resulting sedimentation and turbidity of surface waters. Comply with the requirements herein regardless of whether or not a National Pollution discharge Elimination System (NPDES) permit for the work is required.

Establish a chain of responsibility for operations and subcontractors' operations to ensure that the *Erosion and Sediment Control/Stormwater Pollution Prevention Plan* is implemented and maintained over the life of the contract.

- (A) *Certified Supervisor* - Provide a certified Erosion and Sediment Control/Stormwater Supervisor to manage the Contractor and subcontractor operations, insure compliance with Federal, State and Local ordinances and regulations, and manage the Quality Control Program.
- (B) *Certified Foreman* - Provide a certified, trained foreman for each construction operation that increases the potential for soil erosion or the possible sedimentation and turbidity of surface waters.
- (C) *Certified Installer* - Provide a certified installer to install or direct the installation for erosion or sediment/stormwater control practices.
- (D) *Certified Designer* - Provide a certified designer for the design of the erosion and sediment control/stormwater component of reclamation plans and, if applicable, for the design of the project erosion and sediment control/stormwater plan.

**Roles and Responsibilities**

- (A) *Certified Erosion and Sediment Control/Stormwater Supervisor* - The Certified Supervisor shall be Level II and responsible for ensuring the erosion and sediment control/stormwater plan is adequately implemented and maintained on the project and for conducting the quality control program. The Certified Supervisor shall be on the project within 24 hours notice from initial exposure of an erodible surface to the project's final acceptance. Perform the following duties:
  - (1) *Manage Operations* - Coordinate and schedule the work of subcontractors so that erosion and sediment control/stormwater measures are fully executed for each operation and in a timely manner over the duration of the contract.
    - (a) Oversee the work of subcontractors so that appropriate erosion and sediment control/stormwater preventive measures are conformed to at each stage of the work.
    - (b) Prepare the required National Pollutant Discharge Elimination System (NPDES) Inspection Record and submit to the Engineer.
    - (c) Attend all weekly or monthly construction meetings to discuss the findings of the NPDES inspection and other related issues.
    - (d) Implement the erosion and sediment control/stormwater site plans requested.
    - (e) Provide any needed erosion and sediment control/stormwater practices for the Contractor's temporary work not shown on the plans, such as, but not limited to work platforms, temporary construction, pumping operations, plant and storage yards, and cofferdams.



- (f) Acquire applicable permits and comply with requirements for borrow pits, dewatering, and any temporary work conducted by the Contractor in jurisdictional areas.
  - (g) Conduct all erosion and sediment control/stormwater work in a timely and workmanlike manner.
  - (h) Fully perform and install erosion and sediment control/stormwater work prior to any suspension of the work.
  - (i) Coordinate with Department, Federal, State and Local Regulatory agencies on resolution of erosion and sediment control/stormwater issues due to the Contractor's operations.
  - (j) Ensure that proper cleanup occurs from vehicle tracking on paved surfaces or any location where sediment leaves the Right-of-Way.
  - (k) Have available a set of erosion and sediment control/stormwater plans that are initialed and include the installation date of Best Management Practices. These practices shall include temporary and permanent groundcover and be properly updated to reflect necessary plan and field changes for use and review by Department personnel as well as regulatory agencies.
- (2) Requirements set forth under the NPDES Permit - The Department's NPDES Stormwater permit (NCS000250) outlines certain objectives and management measures pertaining to construction activities. The permit references *NCG010000, General Permit to Discharge Stormwater* under the NPDES, and states that the Department shall incorporate the applicable requirements into its delegated Erosion and Sediment Control Program for construction activities disturbing one or more acres of land. The Department further incorporates these requirements on all contracted bridge and culvert work at jurisdictional waters, regardless of size. Some of the requirements are, but are not limited to:
- (a) Control project site waste to prevent contamination of surface or ground waters of the state, i.e. from equipment operation/maintenance, construction materials, concrete washout, chemicals, litter, fuels, lubricants, coolants, hydraulic fluids, any other petroleum products, and sanitary waste.
  - (b) Inspect erosion and sediment control/stormwater devices and stormwater discharge outfalls at least once every 7 calendar days and within 24 hours after a rainfall event of 0.5 inch that occurs within a 24 hour period. Additional monitoring may be required at the discretion of Division of Water Resources personnel if the receiving stream is 303(d) listed for turbidity and the project has had documented problems managing turbidity.
  - (c) Maintain an onsite rain gauge or use the Department's Multi-Sensor Precipitation Estimate website to maintain a daily record of rainfall amounts and dates.
  - (d) Maintain erosion and sediment control/stormwater inspection records for review by Department and Regulatory personnel upon request.
  - (e) Implement approved reclamation plans on all borrow pits, waste sites and staging areas.
  - (f) Maintain a log of turbidity test results as outlined in the Department's Procedure for Monitoring Borrow Pit Discharge.
  - (g) Provide secondary containment for bulk storage of liquid materials.
  - (h) Provide training for employees concerning general erosion and sediment control/stormwater awareness, the Department's NPDES Stormwater Permit NCS000250 requirements, and the applicable requirements of the *General Permit, NCG010000*.

- (i) Report violations of the NPDES permit to the Engineer immediately who will notify the Division of Water Quality Regional Office within 24 hours of becoming aware of the violation.
- (3) Quality Control Program - Maintain a quality control program to control erosion, prevent sedimentation and follow provisions/conditions of permits. The quality control program shall:
- (a) Follow permit requirements related to the Contractor and subcontractors' construction activities.
  - (b) Ensure that all operators and subcontractors on site have the proper erosion and sediment control/stormwater certification.
  - (c) Notify the Engineer when the required certified erosion and sediment control/stormwater personnel are not available on the job site when needed.
  - (d) Conduct the inspections required by the NPDES permit.
  - (e) Take corrective actions in the proper timeframe as required by the NPDES permit for problem areas identified during the NPDES inspections.
  - (f) Incorporate erosion control into the work in a timely manner and stabilize disturbed areas with mulch/seed or vegetative cover on a section-by-section basis.
  - (g) Use flocculants approved by state regulatory authorities where appropriate and where required for turbidity and sedimentation reduction.
  - (h) Ensure proper installation and maintenance of temporary erosion and sediment control devices.
  - (i) Remove temporary erosion or sediment control devices when they are no longer necessary as agreed upon by the Engineer.
  - (j) The Contractor's quality control and inspection procedures shall be subject to review by the Engineer. Maintain NPDES inspection records and make records available at all times for verification by the Engineer.
- (B) *Certified Foreman* - At least one Certified Foreman shall be onsite for each type of work listed herein during the respective construction activities to control erosion, prevent sedimentation and follow permit provisions:
- (1) Foreman in charge of grading activities
  - (2) Foreman in charge of bridge or culvert construction over jurisdictional areas
  - (3) Foreman in charge of utility activities
- The Contractor may request to use the same person as the Level II Supervisor and Level II Foreman. This person shall be onsite whenever construction activities as described above are taking place. This request shall be approved by the Engineer prior to work beginning.
- The Contractor may request to name a single Level II Foreman to oversee multiple construction activities on small bridge or culvert replacement projects. This request shall be approved by the Engineer prior to work beginning.
- (C) *Certified Installers* - Provide at least one onsite, Level I Certified Installer for each of the following erosion and sediment control/stormwater crew:
- (1) Seeding and Mulching
  - (2) Temporary Seeding
  - (3) Temporary Mulching

- (4) Sodding
- (5) Silt fence or other perimeter erosion/sediment control device installations
- (6) Erosion control blanket installation
- (7) Hydraulic tackifier installation
- (8) Turbidity curtain installation
- (9) Rock ditch check/sediment dam installation
- (10) Ditch liner/matting installation
- (11) Inlet protection
- (12) Riprap placement
- (13) Stormwater BMP installations (such as but not limited to level spreaders, retention/detention devices)
- (14) Pipe installations within jurisdictional areas

If a Level I *Certified Installer* is not onsite, the Contractor may substitute a Level II Foreman for a Level I Installer, provided the Level II Foreman is not tasked to another crew requiring Level II Foreman oversight.

- (D) *Certified Designer* - Include the certification number of the Level III-B Certified Designer on the erosion and sediment control/stormwater component of all reclamation plans and if applicable, the certification number of the Level III-A Certified Designer on the design of the project erosion and sediment control/stormwater plan.

### **Preconstruction Meeting**

Furnish the names of the *Certified Erosion and Sediment Control/Stormwater Supervisor*, *Certified Foremen*, *Certified Installers* and *Certified Designer* and notify the Engineer of changes in certified personnel over the life of the contract within 2 days of change.

### **Ethical Responsibility**

Any company performing work for the North Carolina Department of Transportation has the ethical responsibility to fully disclose any reprimand or dismissal of an employee resulting from improper testing or falsification of records.

### **Revocation or Suspension of Certification**

Upon recommendation of the Chief Engineer to the certification entity, certification for *Supervisor*, *Certified Foremen*, *Certified Installers* and *Certified Designer* may be revoked or suspended with the issuance of an *Immediate Corrective Action (ICA)*, *Notice of Violation (NOV)*, or *Cease and Desist Order* for erosion and sediment control/stormwater related issues.

The Chief Engineer may recommend suspension or permanent revocation of certification due to the following:

- (A) Failure to adequately perform the duties as defined within this certification provision.
- (B) Issuance of an ICA, NOV, or Cease and Desist Order.
- (C) Failure to fully perform environmental commitments as detailed within the permit conditions and specifications.
- (D) Demonstration of erroneous documentation or reporting techniques.
- (E) Cheating or copying another candidate's work on an examination.
- (F) Intentional falsification of records.

- (G) Directing a subordinate under direct or indirect supervision to perform any of the above actions.
- (H) Dismissal from a company for any of the above reasons.
- (I) Suspension or revocation of one's certification by another entity.

Suspension or revocation of a certification will be sent by certified mail to the certificant and the Corporate Head of the company that employs the certificant.

A certificant has the right to appeal any adverse action which results in suspension or permanent revocation of certification by responding, in writing, to the Chief Engineer within 10 calendar days after receiving notice of the proposed adverse action.

Chief Engineer  
1536 Mail Service Center  
Raleigh, NC 27699-1536

Failure to appeal within 10 calendar days will result in the proposed adverse action becoming effective on the date specified on the certified notice. Failure to appeal within the time specified will result in a waiver of all future appeal rights regarding the adverse action taken. The certificant will not be allowed to perform duties associated with the certification during the appeal process.

The Chief Engineer will hear the appeal and make a decision within 7 days of hearing the appeal. Decision of the Chief Engineer will be final and will be made in writing to the certificant.

If a certification is temporarily suspended, the certificant shall pass any applicable written examination and any proficiency examination, at the conclusion of the specified suspension period, prior to having the certification reinstated.

### **Measurement and Payment**

*Certified Erosion and Sediment Control/Stormwater Supervisor, Certified Foremen, Certified Installers and Certified Designer* will be incidental to the project for which no direct compensation will be made.

#### **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.

**DIVISION LET CONTRACT PREQUALIFICATION:**

(07-01-14)(6-1-15)

SPD 01-410

Any firm that wishes to bid as a prime contractor shall be prequalified as a Bidder or PO Prime Contractor prior to submitting a bid. Information regarding prequalification can be found at: <https://connect.ncdot.gov/business/Prequal/Pages/default.aspx>.

In addition, the prime contractor and/or subcontractor(s) shall be prequalified in the work code(s) for which they identify as work items in the prime contractor's construction progress schedule that they will complete themselves. Any contractor identified as working outside their expertise may be considered in default of contract.

**PROJECT SPECIAL PROVISIONS**

**ROADWAY**

**DEMOLITION OF BUILDINGS AND APPURTENANCES:**

(1-1-02) (Rev. 1-17-12)

210

SP2 R10

Demolish the buildings and appurtenances listed below in accordance with Section 210 of the *2012 Standard Specifications*:

Building Removal (number)
(location)
Parcel #(number)
(Description)

Building Removal (number)
(location)
Parcel #(number)
(Description)

Building Removal (number)
(location)
Parcel #(number)
(Description)

Building Removal (number)
(location)
Parcel #(number)
(Description)

**DETECTABLE WARNINGS FOR PROPOSED CURB RAMPS:**

(6-15-10) (Rev. 8-16-11)

848

SP8 R126

**Description**

Construct detectable warnings consisting of integrated raised truncated domes on proposed concrete curb ramps in accordance with the *2012 Standard Specifications*, plan details, the requirements of the *28 CFR Part 36 ADA Standards for Accessible Design* and this provision.

**Materials**

Detectable warning for proposed curb ramps shall consist of integrated raised truncated domes. The description, size and spacing shall conform to Section 848 of the *2012 Standard Specifications*.

Use material for detectable warning systems as shown herein. Material and coating specifications must be stated in the Manufacturers Type 3 Certification and all Detectable Warning systems must be on the NCDOT Approved Products List.

Install detectable warnings created from one of the following materials: precast concrete blocks or bricks, clay paving brick, gray or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber

or composite tile. Only one material type for detectable warning will be permitted per project, unless otherwise approved by the Engineer.

- (A) Detectable Warnings shall consist of a base with integrated raised truncated domes, and when constructed of precast concrete they shall conform to the material requirements of Article 848-2 of the *2012 Standard Specifications*.
- (B) Detectable Warnings shall consist of a base with integrated raised truncated domes, and may be comprised of other materials including, but not limited, to clay paving brick, gray iron or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile, which are cast into the concrete of the curb ramps. The material shall have an integral color throughout the thickness of the material. The detectable warning shall include fasteners or anchors for attachment in the concrete and shall be furnished as a system from the manufacturer.

Prior to installation, the Contractor shall submit to the Engineer assembling instructions from the manufacturer for each type of system used in accordance with Article 105-2 of the *2012 Standard Specifications*. The system shall be furnished as a kit containing all consumable materials and consumable tools, required for the application. They shall be capable of being affixed to or anchored in the concrete curb ramp, including green concrete (concrete that has set but not appreciably hardened). The system shall be solvent free and contain no volatile organic compounds (VOC). The static coefficient of friction shall be 0.8 or greater when measured on top of the truncated domes and when measured between the domes in accordance with ASTM C1028 (dry and wet). The system shall be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to degradation by motor fuels, lubricants and antifreeze.

- (C) When steel or gray iron or ductile iron casting products are provided, only products that meet the requirements of Subarticle 106-1(B) of the *2012 Standard Specifications* may be used. Submit to the Engineer a Type 6 Certification, catalog cuts and installation procedures at least 30 days prior to installation for all.

### **Construction Methods**

- (A) Prior to placing detectable warnings in proposed concrete curb ramps, adjust the existing subgrade to the proper grade and in accordance with Article 848-3 of the *2012 Standard Specifications*.
- (B) Install all detectable warning in proposed concrete curb ramps in accordance with the manufacturer's recommendations.

### **Measurement and Payment**

Detectable Warnings installed for construction of proposed curb ramps will not be paid for separately. Such payment will be included in the price bid for *Concrete Curb Ramps*.

### **MATERIALS:**

(2-21-12) (Rev. 11-22-16) 1000, 1002, 1005, 1016, 1018, 1024, 1050, 1074, 1078, 1080, 1081, 1086, 1084, 1087, 1092 SP10 R01

Revise the *2012 Standard Specifications* as follows:

**Page 10-1, Article 1000-1, DESCRIPTION, lines 9-10**, replace the last sentence of the first paragraph with the following:

Type IL, IP, IS or IT blended cement may be used instead of Portland cement.

**Page 10-1, Article 1000-1, DESCRIPTION, line 14**, add the following:

If any change is made to the mix design, submit a new mix design (with the exception of an approved pozzolan source change).

If any major change is made to the mix design, also submit new test results showing the mix design conforms to the criteria. Define a major change to the mix design as:

- (1) A source change in coarse aggregate, fine aggregate or cement.
- (2) A pozzolan class or type change (e.g. Class F fly ash to Class C fly ash).
- (3) A quantitative change in coarse aggregate (applies to an increase or decrease greater than 5%), fine aggregate (applies to an increase or decrease greater than 5%), water (applies to an increase only), cement (applies to a decrease only), or pozzolan (applies to an increase or decrease greater than 5%).

Use materials which do not produce a mottled appearance through rusting or other staining of the finished concrete surface.

**Page 10-1, Article 1000-2, MATERIALS, line 16; Page 10-8, Subarticle 1000-7(A), Materials, line 8; and Page 10-18, Article 1002-2, MATERIALS, line 9**, add the following to the table of item references:

<b>Item</b>	<b>Section</b>
Type IL Blended Cement	1024-1

**Page 10-1, Subarticle 1000-3(A), Composition and Design, lines 25-27**, replace the second paragraph with the following:

Fly ash may be substituted for cement in the mix design up to 30% at a rate of 1.0 lb of fly ash to each pound of cement replaced.

**Page 10-2, Subarticle 1000-3(A), Composition and Design, lines 12-21**, delete the third paragraph through the sixth paragraph beginning with “If any change is made to the mix design, submit...” through “...(applies to a decrease only).”



Page 10-5, Table 1000-1, REQUIREMENTS FOR CONCRETE, replace with the following:

TABLE 1000-1 REQUIREMENTS FOR CONCRETE											
Class of Concrete	Min. Comp. Strength at 28 days	Maximum Water-Cement Ratio				Consistency Max. Slump		Cement Content			
		Air-Entrained Concrete		Non Air-Entrained Concrete		Vibrated	Non-Vibrated	Vibrated		Non-Vibrated	
		Rounded Aggregate	Angular Aggregate	Rounded Aggregate	Angular Aggregate			Min.	Max.	Min.	Max.
Units	psi					inch	inch	lb/cy	lb/cy	lb/cy	lb/cy
AA	4,500	0.381	0.426	-	-	3.5	-	639	715	-	-
AA Slip Form	4,500	0.381	0.426	-	-	1.5	-	639	715	-	-
Drilled Pier	4,500	-	-	0.450	0.450	-	5-7 dry 7-9 wet	-	-	640	800
A	3,000	0.488	0.532	0.550	0.594	3.5	4	564	-	602	-
B	2,500	0.488	0.567	0.559	0.630	1.5 machine-placed 2.5 hand-placed	4	508	-	545	-
Sand Light-weight	4,500	-	0.420	-	-	4	-	715	-	-	-
Latex Modified	3,000 7 day	0.400	0.400	-	-	6	-	658	-	-	-
Flowable Fill excavatable	150 max. at 56 days	as needed	as needed	as needed	as needed	-	Flowable	-	-	40	100
Flowable Fill non-excavatable	125	as needed	as needed	as needed	as needed	-	Flowable	-	-	100	as needed
Pavement	4,500 design, field 650 flexural, design only	0.559	0.559	-	-	1.5 slip form 3.0 hand place	-	526	-	-	-
Precast	See Table 1077-1	as needed	as needed	-	-	6	as needed	as needed	as needed	as needed	as needed
Prestress	per contract	See Table 1078-1	See Table 1078-1	-	-	8	-	564	as needed	-	-

Page 10-6, Subarticle 1000-4(I), Use of Fly Ash, lines 36-2, replace the first paragraph with the following:

Fly ash may be substituted for cement in the mix design up to 30% at a rate of 1.0 lb of fly ash to each pound of cement replaced. Use Table 1000-1 to determine the maximum allowable water-cementitious material (cement + fly ash) ratio for the classes of concrete listed.

Page 10-7, Table 1000-3, MAXIMUM WATER-CEMENTITIOUS MATERIAL RATIO, delete the table.

**Page 10-7, Article 1000-5, HIGH EARLY STRENGTH PORTLAND CEMENT CONCRETE, lines 30-31,** delete the second sentence of the third paragraph.

**Page 10-19, Article 1002-3, SHOTCRETE FOR TEMPORARY SUPPORT OF EXCAVATIONS, line 30,** add the following at the end of Section 1002:

**(H) Handling and Storing Test Panels**

Notify the Area Materials Engineer when preconstruction or production test panels are made within 24 hours of shooting the panels. Field cure and protect test panels from damage in accordance with ASTM C1140 until the Department transports panels to the Materials and Tests Regional Laboratory for coring.

Page 10-23, Table 1005-1, AGGREGATE GRADATION-COARSE AGGREGATE, replace with the following:

TABLE 1005-1 AGGREGATE GRADATION - COARSE AGGREGATE													
Std. Size #	Percentage of Total by Weight Passing											Remarks	
	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#40		#200
4	100	90-100	20-55	0-15	-	0-5	-	-	-	-	-	A	Asphalt Plant Mix
467M	100	95-100	-	35-70	-	0-30	0-5	-	-	-	-	A	Asphalt Plant Mix
5	-	100	90-100	20-55	0-10	0-5	-	-	-	-	-	A	AST, Sediment Control Stone
57	-	100	95-100	-	25-60	-	0-10	0-5	-	-	-	A	AST, Structural Concrete, Shoulder Drain Stone, Sediment Control Stone
57M	-	100	95-100	-	25-45	-	0-10	0-5	-	-	-	A	AST, Concrete Pavement
6M	-	-	100	90-100	20-55	0-20	0-8	-	-	-	-	A	AST
67	-	-	100	90-100	-	20-55	0-10	0-5	-	-	-	A	Asphalt Plant Mix, AST, Structural Concrete
78M	-	-	-	100	98-100	75-100	20-45	0-15	-	-	-	A	Asphalt Plant Mix, AST, Structural Concrete, Weep Hole Drains
14M	-	-	-	-	100	98-100	35-70	5-20	-	0-8	-	A	Asphalt Plant Mix, AST, Structural Concrete, Weep Hole Drains
9M	-	-	-	-	100	98-100	85-100	10-40	-	0-10	-	A	AST
ABC	-	100	75-97	-	55-80	-	35-55	-	25-45	-	14-30	4-12 <sup>B</sup>	Aggregate Base Course, Aggregate Stabilization
ABC(M)	-	100	75-100	-	45-79	-	20-40	-	0-25	-	-	0-12 <sup>B</sup>	Maintenance Stabilization
Light-weight <sup>C</sup>	-	-	-	-	100	80-100	5-40	0-20	-	0-10	-	0-2.5	AST

- A. See Subarticle 1005-4(A).
- B. See Subarticle 1005-4(B).
- C. For Lightweight Aggregate used in Structural Concrete, see Subarticle 1014-2(E)(6).

**Page 10-39, Article 1016-3, CLASSIFICATIONS** , lines 27-32, replace with the following:

Select material is clean, unweathered durable, blasted rock material obtained from an approved source. While no specific gradation is required, the below criteria will be used to evaluate the materials for visual acceptance by the Engineer:

- (A) At least 50% of the rock has a diameter of from 1.5 ft to 3 ft,
- (B) 30% of the rock ranges in size from 2" to 1.5 ft in diameter, and
- (C) Not more than 20% of the rock is less than 2" in diameter. No rippable rock will be permitted.

**Page 10-40, Tables 1018-1 and 1018-2, PIEDMONT, WESTERN AND COASTAL AREA CRITERIA FOR ACCEPTANCE OF BORROW MATERIAL**, under second column in both tables, replace second row with the following:

Acceptable, but not to be used in the top 3 ft of embankment or backfill

**Page 10-46, Article 1024-1, PORTLAND CEMENT, line 33**, add the following as the ninth paragraph:

Use Type IL blended cement that meets AASHTO M 240, except that the limestone content is limited to between 5 and 12% by weight and the constituents shall be interground. Class F fly ash can replace a portion of Type IL blended cement and shall be replaced as outlined in Subarticle 1000-4(I) for Portland cement. For mixes that contain cement with alkali content between 0.6% and 1.0% and for mixes that contain a reactive aggregate documented by the Department, use a pozzolan in the amount shown in Table 1024-1.

**Page 10-46, Table 1024-1, POZZOLANS FOR USE IN PORTLAND CEMENT CONCRETE**, replace with the following:

<b>TABLE 1024-1 POZZOLANS FOR USE IN PORTLAND CEMENT CONCRETE</b>	
<b>Pozzolan</b>	<b>Rate</b>
Class F Fly Ash	20% - 30% by weight of required cement content with 1.0 lb Class F fly ash per lb of cement replaced
Ground Granulated Blast Furnace Slag	35%-50% by weight of required cement content with 1.0 lb slag per lb of cement replaced
Microsilica	4%-8% by weight of required cement content with 1.0 lb microsilica per lb of cement replaced

**Page 10-47, Subarticle 1024-3(B), Approved Sources, lines 16-18**, replace the second sentence of the second paragraph with the following:

Tests shall be performed by AASHTO's designated National Transportation Product Evaluation Program (NTPEP) laboratory for concrete admixture testing.

**Page 10-65, Article 1050-1, GENERAL, line 41**, replace the first sentence with the following:

All fencing material and accessories shall meet Section 106.

**Page 10-115, Subarticle 1074-7(B), Gray Iron Castings, lines 10-11,** replace the first two sentences with the following:

Supply gray iron castings meeting all facets of AASHTO M 306 excluding proof load. Proof load testing will only be required for new casting designs during the design process, and conformance to M306 loading (40,000 lb.) will be required only when noted on the design documents.

**Page 10-126, Table 1078-1, REQUIREMENTS FOR CONCRETE,** replace with the following:

<b>TABLE 1078-1 REQUIREMENTS FOR CONCRETE</b>		
<b>Property</b>	<b>28 Day Design Compressive Strength 6,000 psi or less</b>	<b>28 Day Design Compressive Strength greater than 6,000 psi</b>
Maximum Water/Cementitious Material Ratio	0.45	0.40
Maximum Slump without HRWR	3.5"	3.5"
Maximum Slump with HRWR	8"	8"
Air Content (upon discharge into forms)	5 + 2%	5 + 2%

**Page 10-151, Article 1080-4, INSPECTION AND SAMPLING, lines 18-22,** replace (B), (C) and (D) with the following:

- (B) At least 3 panels prepared as specified in 5.5.10 of AASHTO M 300, Bullet Hole Immersion Test.
- (C) At least 3 panels of 4"x6"x1/4" for the Elcometer Adhesion Pull Off Test, ASTM D4541.
- (D) A certified test report from an approved independent testing laboratory for the Salt Fog Resistance Test, Cyclic Weathering Resistance Test, and Bullet Hole Immersion Test as specified in AASHTO M 300.
- (E) A certified test report from an approved independent testing laboratory that the product has been tested for slip coefficient and meets AASHTO M253, Class B.

**Page 10-161, Subarticle 1081-1(A), Classifications, lines 29-33,** delete first 3 sentences of the description for Type 2 and replace with the following:

**Type 2** - A low-modulus, general-purpose adhesive used in epoxy mortar repairs. It may be used to patch spalled, cracked or broken concrete where vibration, shock or expansion and contraction are expected.

**Page 10-162, Subarticle 1081-1(A), Classifications, lines 4-7,** delete the second and third sentences of the description for Type 3A. **Lines 16-22,** delete Types 6A, 6B and 6C.

**Page 10-162, Subarticle 1081-1(B), Requirements, lines 26-30,** replace the second paragraph with the following:

For epoxy resin systems used for embedding dowel bars, threaded rods, rebar, anchor bolts and other fixtures in hardened concrete, the manufacturer shall submit test results showing that the bonding system will obtain 125% of the specified required yield strength of the fixture. Furnish certification that, for the

particular bolt grade, diameter and embedment depth required, the anchor system will not fail by adhesive failure and that there is no movement of the anchor bolt. For certification and anchorage, use 3,000 psi as the minimum Portland cement concrete compressive strength used in this test. Use adhesives that meet Section 1081.

List the properties of the adhesive on the container and include density, minimum and maximum temperature application, setting time, shelf life, pot life, shear strength and compressive strength.

Page 10-163, Table 1081-1, PROPERTIES OF MIXED EPOXY RESIN SYSTEMS, replace with the following:

<b>TABLE 1081-1 PROPERTIES OF MIXED EPOXY RESIN SYSTEMS</b>								
<b>Property</b>	<b>Type 1</b>	<b>Type 2</b>	<b>Type 3</b>	<b>Type 3A</b>	<b>Type 4A</b>	<b>Type 4B</b>	<b>Type 5</b>	
Viscosity-Poises at 77°F ± 2°F	Gel	10-30	25-75	Gel	40-150	40-150	1-6	
Spindle No.	-	3	4	--	4	4	2	
Speed (RPM)	-	20	20	--	10	10	50	
Pot Life (Minutes)	20-50	30-60	20-50	5-50	40-80	40-80	20-60	
Minimum Tensile Strength at 7 days (psi)	1,500	2,000	4,000	4,000	1,500	1,500	4,000	
Tensile Elongation at 7 days (%)	30 min.	30 min.	2-5	2-5	5-15	5-15	2-5	
Min. Compressive Strength of 2" mortar cubes at 24 hours	3,000 (Neat)	4,000-	6,000-	6,000 (Neat)	3,000	3,000	6,000	
Min. Compressive Strength of 2" mortar cubes at 7 days	5,000 (Neat)	-	-	-	-	5,000	-	
Maximum Water Absorption (%)	1.5	1.0	1.0	1.5	1.0	1.0	1.0	
Min. Bond Strength Slant Shear Test at 14 days (psi)	1,500	1,500	2,000	2,000	1,500	1,500	1,500	

**Page 10-164, Subarticle 1081-1(E), Prequalification, lines 31-33**, replace the second sentence of the first paragraph with the following:

Manufacturers choosing to supply material for Department jobs must submit an application through the Value Management Unit with the following information for each type and brand name:

**Page 10-164, Subarticle 1081-1(E)(3), line 37**, replace with the following:

(3) Type of the material in accordance with Articles 1081-1 and 1081-4,

**Page 10-165, Subarticle 1081-1(E)(6), line 1**, in the first sentence of the first paragraph replace “AASHTO M 237” with “the specifications”.

**Page 10-165, Subarticle 1081-1(E), Prequalification, line 9-10**, delete the second sentence of the last paragraph.

**Page 10-165, Subarticle 1081-1(F), Acceptance, line 14**, in the first sentence of the first paragraph replace “Type 1” with “Type 3”.

**Page 10-169, Subarticle 1081-3(G), Anchor Bolt Adhesives**, delete this subarticle.

**Page 10-170, Article 1081-3, HOT BITUMEN, line 9**, add the following at the end of Section 1081:

#### **1081-4 EPOXY RESIN ADHESIVE FOR BONDING TRAFFIC MARKINGS**

##### **(A) General**

This section covers epoxy resin adhesive for bonding traffic markers to pavement surfaces.

##### **(B) Classification**

The types of epoxies and their uses are as shown below:

**Type I** – Rapid Setting, High Viscosity, Epoxy Adhesive. This type of adhesive provides rapid adherence to traffic markers to the surface of pavement.

**Type II** – Standard Setting, High Viscosity, Epoxy Adhesive. This type of adhesive is recommended for adherence of traffic markers to pavement surfaces when rapid set is not required.

**Type III** – Rapid Setting, Low Viscosity, Water Resistant, Epoxy Adhesive. This type of rapid setting adhesive, due to its low viscosity, is appropriate only for use with embedded traffic markers.

**Type IV** – Standard Set Epoxy for Blade Deflecting-Type Plowable Markers.

##### **(C) Requirements**

Epoxies shall conform to the requirements set forth in AASHTO M 237.

##### **(D) Prequalification**

Refer to Subarticle 1081-1(E).

##### **(E) Acceptance**

Refer to Subarticle 1081-1(F).

**Page 10-173, Article 1084-2, STEEL SHEET PILES, lines 37-38**, replace first paragraph with the following:

Steel sheet piles detailed for permanent applications shall be hot rolled and meet ASTM A572 or ASTM A690 unless otherwise required by the plans. Steel sheet piles shall be coated as required by the plans. Galvanized sheet piles shall be coated in accordance with Section 1076. Metallized sheet piles shall be

metallized in accordance to the Project Special Provision “Thermal Sprayed Coatings (Metallization)” with an 8 mil, 99.9% aluminum alloy coating and a 0.5 mil seal coating. Any portion of the metallized sheet piling encased in concrete shall receive a barrier coat. The barrier coat shall be an approved waterborne coating with a low-viscosity which readily absorbs into the pores of the aluminum thermal sprayed coating. The waterborne coating shall be applied at a spreading rate that results in a theoretical 1.5 mil dry film thickness. The manufacturer shall issue a letter of certification that the resin chemistry of the waterborne coating is compatible with the 99.9% aluminum thermal sprayed alloy and suitable for tidal water applications.

**Page 10-174, Subarticle 1086-1(B)(1), Epoxy, lines 18-24,** replace with the following:

The epoxy shall meet Article 1081-4.

The 2 types of epoxy adhesive which may be used are Type I, Rapid Setting, and Type II, Standard Setting. Use Type II when the pavement temperature is above 60°F or per the manufacturer’s recommendations whichever is more stringent. Use Type I when the pavement temperature is between 50°F and 60°F or per the manufacturer’s recommendations whichever is more stringent. Epoxy adhesive Type I, Cold Set, may be used to attach temporary pavement markers to the pavement surface when the pavement temperature is between 32°F and 50°F or per the manufacturer’s recommendations whichever is more stringent.

**Page 10-175, Subarticle 1086-2(E), Epoxy Adhesives, line 27,** replace “Section 1081” with “Article 1081-4”.

**Page 10-177, Subarticle 1086-3(E), Epoxy Adhesives, line 22,** replace “Section 1081” with “Article 1081-4”.

**Page 10-179, Subarticle 1087-4(A), Composition, lines 39-41,** replace the third paragraph with the following:

All intermixed and drop-on glass beads shall not contain more than 75 ppm arsenic or 200 ppm lead.

**Page 10-180, Subarticle 1087-4(B), Physical Characteristics, line 8,** replace the second paragraph with the following:

All intermixed and drop-on glass beads shall comply with NCGS § 136-30.2 and 23 USC § 109(r).

**Page 10-181, Subarticle 1087-7(A), Intermixed and Drop-on Glass Beads, line 24,** add the following after the first paragraph:

Use X-ray Fluorescence for the normal sampling procedure for intermixed and drop-on beads, without crushing, to check for any levels of arsenic and lead. If any arsenic or lead is detected, the sample shall be crushed and repeat the test using X-ray Fluorescence. If the X-ray Fluorescence test shows more than a LOD of 5 ppm, test the beads using United States Environmental Protection Agency Method 6010B, 6010C or 3052 for no more than 75 ppm arsenic or 200 ppm lead.

**GROUT PRODUCTION AND DELIVERY:**

(3-17-15)

1003

SP10 R20

Revise the *2012 Standard Specifications* as follows:

Replace Section 1003 with the following:

**SECTION 1003  
GROUT PRODUCTION AND DELIVERY**



**1003-1 DESCRIPTION**

This section addresses cement grout to be used for structures, foundations, retaining walls, concrete barriers, embankments, pavements and other applications in accordance with the contract. Produce non-metallic grout composed of Portland cement and water and at the Contractor's option or as required, aggregate and pozzolans. Include chemical admixtures as required or needed. Provide sand cement or neat cement grout as required. Define "sand cement grout" as grout with only fine aggregate and "neat cement grout" as grout without aggregate.

The types of grout with their typical uses are as shown below:

**Type 1** – A cement grout with only a 3-day strength requirement and a fluid consistency that is typically used for filling subsurface voids.

**Type 2** – A nonshrink grout with strength, height change and flow conforming to ASTM C1107 that is typically used for foundations, ground anchors and soil nails.

**Type 3** – A nonshrink grout with high early strength and freeze-thaw durability requirements that is typically used in pile blockouts, grout pockets, shear keys, dowel holes and recesses for concrete barriers and structures.

**Type 4** – A neat cement grout with low strength, a fluid consistency and high fly ash content that is typically used for slab jacking.

**Type 5** – A low slump, low mobility sand cement grout with minimal strength that is typically used for compaction grouting.

**1003-2 MATERIALS**

Refer to Division 10.

<b>Item</b>	<b>Section</b>
Chemical Admixtures	1024-3
Fine Aggregate	1014-1
Fly Ash	1024-5
Ground Granulated Blast Furnace Slag	1024-6
Portland Cement	1024-1
Silica Fume	1024-7
Water	1024-4

Do not use grout that contains soluble chlorides or more than 1% soluble sulfate. At the Contractor's option, use an approved packaged grout instead of the materials above except for water. Use packaged grouts that are on the NCDOT Approved Products List.

Use admixtures for grout that are on the NCDOT Approved Products List or other admixtures in accordance with Subarticle 1024-3(E) except do not use concrete additives or unclassified or other admixtures in Type 4 or 5 grout. Use Class F fly ash for Type 4 grout and Type II Portland cement for Type 5 grout.

Use well graded rounded aggregate with a gradation, liquid limit (LL) and plasticity index (PI) that meet Table 1003-1 for Type 5 grout. Fly ash may be substituted for a portion of the fines in the aggregate. Do not use any other pozzolans in Type 5 grout.

**TABLE 1003-1  
AGGREGATE REQUIREMENTS FOR TYPE 5 GROUT**

Gradation		Maximum Liquid Limit	Maximum Plasticity Index
Sieve Designation per AASHTO M 92	Percentage Passing (% by weight)		
3/8"	100	N/A	N/A
No. 4	70 – 95		
No. 8	50 – 90		
No. 16	30 – 80		
No. 30	25 – 70		
No. 50	20 – 50		
No. 100	15 – 40	25	10
No. 200	10 – 30		

### 1003-3 COMPOSITION AND DESIGN

When using an approved packaged grout, a grout mix design submittal is not required. Otherwise, submit proposed grout mix designs for each grout mix to be used in the work. Mixes for all grout shall be designed by a Certified Concrete Mix Design Technician or an Engineer licensed by the State of North Carolina. Mix proportions shall be determined by a testing laboratory approved by the Department. Base grout mix designs on laboratory trial batches that meet Table 1003-2 and this section. With permission, the Contractor may use a quantity of chemical admixture within the range shown on the current list of approved admixtures maintained by the Materials and Tests Unit.

Submit grout mix designs in terms of saturated surface dry weights on Materials and Tests Form 312U at least 35 days before proposed use. Adjust batch proportions to compensate for surface moisture contained in the aggregates at the time of batching. Changes in the saturated surface dry mix proportions will not be permitted unless revised grout mix designs have been submitted to the Engineer and approved.

Accompany Materials and Tests Form 312U with a listing of laboratory test results of compressive strength, density and flow or slump and if applicable, aggregate gradation, durability and height change. List the compressive strength of at least three 2" cubes at the age of 3 and 28 days.

The Engineer will review the grout mix design for compliance with the contract and notify the Contractor as to its acceptability. Do not use a grout mix until written notice has been received. Acceptance of the grout mix design or use of approved packaged grouts does not relieve the Contractor of his responsibility to furnish a product that meets the contract. Upon written request from the Contractor, a grout mix design accepted and used satisfactorily on any Department project may be accepted for use on other projects.

Perform laboratory tests in accordance with the following test procedures:

Property	Test Method
Aggregate Gradation <sup>A</sup>	AASHTO T 27
Compressive Strength	AASHTO T 106
Density (Unit Weight)	AASHTO T 121, AASHTO T 133 <sup>B</sup> ,

	ANSI/API RP <sup>C</sup> 13B-1 <sup>B</sup> (Section 4, Mud Balance)
Durability	AASHTO T 161 <sup>D</sup>
Flow	ASTM C939 (Flow Cone)
Height Change	ASTM C1090 <sup>E</sup>
Slump	AASHTO T 119

- A. Applicable to grout with aggregate.
- B. Applicable to Neat Cement Grout.
- C. American National Standards Institute/American Petroleum Institute Recommended Practice.
- D. Procedure A (Rapid Freezing and Thawing in Water) required.
- E. Moist room storage required.

### 1003-4 GROUT REQUIREMENTS

Provide grout types in accordance with the contract. Use grouts with properties that meet Table 1003-2. The compressive strength of the grout will be considered the average compressive strength test results of three 2" cubes at each age. Make cubes that meet AASHTO T 106 from the grout delivered for the work or mixed on-site. Make cubes at such frequencies as the Engineer may determine and cure them in accordance with AASHTO T 106.

Type of Grout	Minimum Compressive Strength at		Height Change at 28 days	Flow <sup>A</sup> /Slump <sup>B</sup>	Minimum Durability Factor
	3 days	28 days			
1	3,000 psi	–	–	10 – 30 sec	–
2	Table 1 <sup>C</sup>			Fluid Consistency <sup>C</sup>	–
3	5,000 psi	–	0 – 0.2%	Per Accepted Grout Mix Design/ Approved Packaged Grout	80
4 <sup>D</sup>	600 psi	1,500 psi	–	10 – 26 sec	–
5	–	500 psi	–	1 – 3"	–

- A. Applicable to Type 1 through 4 grouts.
- B. Applicable to Type 5 grout.
- C. ASTM C1107.
- D. Use Type 4 grout with proportions by volume of 1 part cement and 3 parts fly ash.

### 1003-5 TEMPERATURE REQUIREMENTS

When using an approved packaged grout, follow the manufacturer's instructions for grout and air temperature at the time of placement. Otherwise, the grout temperature at the time of placement shall be not less than 50°F nor more than 90°F. Do not place grout when the air temperature measured at the location of the grouting operation in the shade away from artificial heat is below 40°F.

### 1003-6 ELAPSED TIME FOR PLACING GROUT

Agitate grout continuously before placement. Regulate the delivery so the maximum interval between the

placing of batches at the work site does not exceed 20 minutes. Place grout before exceeding the times in Table 1003-3. Measure the elapsed time as the time between adding the mixing water to the grout mix and placing the grout.

<b>TABLE 1003-3 ELAPSED TIME FOR PLACING GROUT (with continuous agitation)</b>		
<b>Air or Grout Temperature, Whichever is Higher</b>	<b>Maximum Elapsed Time</b>	
	<b>No Retarding Admixture Used</b>	<b>Retarding Admixture Used</b>
90°F or above	30 minutes	1 hr. 15 minutes
80°F through 89°F	45 minutes	1 hr. 30 minutes
79°F or below	60 minutes	1 hr. 45 minutes

### **1003-7 MIXING AND DELIVERY**

Use grout free of any lumps and undispersed cement. When using an approved packaged grout, mix grout in accordance with the manufacturer's instructions. Otherwise, comply with Articles 1000-8 through 1000-12 to the extent applicable for grout instead of concrete.

### **GEOSYNTHETICS:**

(2-16-16)

1056

SP10 R25

Revise the *2012 Standard Specifications* as follows:

Replace Section 1056 with the following:

### **SECTION 1056 GEOSYNTHETICS**

#### **1056-1 DESCRIPTION**

Provide geosynthetics for subsurface drainage, separation, stabilization, reinforcement, erosion control, filtration and other applications in accordance with the contract. Use geotextiles, geocomposite drains and geocells that are on the NCDOT Approved Products List. Prefabricated geocomposite drains include sheet, strip and vertical drains (PVDs), i.e., "wick drains" consisting of a geotextile attached to and/or encapsulating a plastic drainage core. Geocells are comprised of ultrasonically welded polymer strips that when expanded form a 3D honeycomb grid that is typically filled with material to support vegetation.

If necessary or required, hold geotextiles and sheet drains in place with new wire staples, i.e., "sod staples" that meet Subarticle 1060-8(D) or new anchor pins. Use steel anchor pins with a diameter of at least 3/16" and a length of at least 18" and with a point at one end and a head at the other end that will retain a steel washer with an outside diameter of at least 1.5".

#### **1056-2 HANDLING AND STORING**

Load, transport, unload and store geosynthetics so geosynthetics are kept clean and free of damage. Label, ship and store geosynthetics in accordance with Section 7 of AASHTO M 288. Geosynthetics with defects, flaws, deterioration or damage will be rejected. Do not unwrap geosynthetics until just before installation. Do not leave geosynthetics exposed for more than 7 days before covering except for geosynthetics for temporary wall faces and erosion control.

### **1056-3 CERTIFICATIONS**

Provide Type 1, Type 2 or Type 4 material certifications in accordance with Article 106-3 for geosynthetics. Define “minimum average roll value” (MARV) in accordance with ASTM D4439. Provide certifications with MARV for geosynthetic properties as required. Test geosynthetics using laboratories accredited by the Geosynthetic Accreditation Institute (GAI) to perform the required test methods. Sample geosynthetics in accordance with ASTM D4354.

### **1056-4 GEOTEXTILES**

When required, sew geotextiles together in accordance with Article X1.1.4 of AASHTO M 288. Provide sewn seams with seam strengths meeting the required strengths for the geotextile type and class specified.

Provide geotextile types and classes in accordance with the contract. Geotextiles will be identified by the product name printed directly on the geotextile. When geotextiles are not marked with a product name or marked with only a manufacturing plant identification code, geotextiles will be identified by product labels attached to the geotextile wrapping. When identification is based on labels instead of markings, unwrap geotextiles just before use in the presence of the Engineer to confirm that the product labels on both ends of the outside of the geotextile outer wrapping match the labels affixed to both ends of the inside of the geotextile roll core. Partial geotextile rolls without the product name printed on the geotextile or product labels affixed to the geotextile roll core may not be used.

Use woven or nonwoven geotextiles with properties that meet Table 1056-1. Define “machine direction” (MD) and “cross-machine direction” (CD) in accordance with ASTM D4439.

Property	Requirement					Test Method
	Type 1	Type 2	Type 3 <sup>A</sup>	Type 4	Type 5 <sup>B</sup>	
<i>Typical Application</i>	<i>Shoulder Drains</i>	<i>Under Rip Rap</i>	<i>Silt Fence Fabric</i>	<i>Soil Stabilization</i>	<i>Temporary Walls</i>	
Elongation (MD & CD)	≥ 50%	≥ 50%	≤ 25%	< 50%	< 50%	ASTM D4632
Grab Strength (MD & CD)	Table 1 <sup>D</sup> , Class 3	Table 1 <sup>D</sup> , Class 1	100 lb <sup>C</sup>	Table 1 <sup>D</sup> , Class 3	-	ASTM D4632
Tear Strength (MD & CD)			-			ASTM D4533
Puncture Strength			-			ASTM D6241
Ultimate Tensile Strength (MD & CD)	-	-	-	-	2,400 lb/ft <sup>C</sup> (unless required otherwise in the contract)	ASTM D4595
Permittivity	Table 2 <sup>D</sup> , 15% to 50% in <i>Situ</i> Soil Passing 0.075 mm	Table 6 <sup>D</sup> , 15% to 50% in <i>Situ</i> Soil Passing 0.075mm	Table 7 <sup>D</sup>	Table 5 <sup>D</sup>	0.20 sec <sup>-1</sup> . <sup>C</sup>	ASTM D4491
Apparent Opening Size					0.60 mm <sup>E</sup>	ASTM D4751
UV Stability (Retained Strength)					70% <sup>C</sup> (after 500 hr of exposure)	ASTM D4355

- A. Minimum roll width of 36" required.  
 B. Minimum roll width of 13 ft required.  
 C. MARV per Article 1056-3.  
 D. AASHTO M 288.  
 E. Maximum average roll value.

### 1056-5 GEOCOMPOSITE DRAINS

Provide geocomposite drain types in accordance with the contract and with properties that meet Table 1056-2.

Property	Requirement			Test Method
	Sheet Drain	Strip Drain	Wick Drain	
Width	≥ 12" (unless required otherwise in the contract)	12" ±1/4"	4" ±1/4"	N/A
In-Plane Flow Rate <sup>A</sup> (with gradient of 1.0 and 24-hour seating period)	6 gpm/ft @ applied normal compressive stress of 10 psi	15 gpm/ft @ applied normal compressive stress of 7.26 psi	1.5 gpm <sup>B</sup> @ applied normal compressive stress of 40 psi	ASTM D4716

- A. MARV per Article 1056-3.
- B. Per 4" drain width.

For sheet and strip drains, use accessories (e.g., pipe outlets, connectors, fittings, etc.) recommended by the Drain Manufacturer. Provide sheet and strip drains with Type 1 geotextiles heat bonded or glued to HDPE, polypropylene or high impact polystyrene drainage cores that meet Table 1056-3.

Property	Requirement (MARV)		Test Method
	Sheet Drain	Strip Drain	
Thickness	1/4"	1"	ASTM D1777 or D5199
Compressive Strength	40 psi	30 psi	ASTM D6364

For wick drains with a geotextile wrapped around a corrugated drainage core and seamed to itself, use drainage cores with an ultimate tensile strength of at least 225 lb per 4" width in accordance with ASTM D4595 and geotextiles with properties that meet Table 1056-4.

Property	Requirement	Test Method
Elongation	≥ 50%	ASTM D4632
Grab Strength	Table 1 <sup>A</sup> , Class 3	ASTM D4632
Tear Strength		ASTM D4533
Puncture Strength		ASTM D6241
Permittivity	0.7 sec <sup>-1</sup> <sup>B</sup>	ASTM D4491
Apparent Opening Size (AOS)	Table 2 <sup>A</sup> ,	ASTM D4751
UV Stability (Retained Strength)	> 50% <i>in Situ</i> Soil Passing 0.075 mm	ASTM D4355

- A. AASHTO M 288.
- B. MARV per Article 1056-3.

For wick drains with a geotextile fused to both faces of a corrugated drainage core along the peaks of the corrugations, use wick drains with an ultimate tensile strength of at least 1,650 lb/ft in accordance with ASTM D4595 and geotextiles with a permittivity, AOS and UV stability that meet Table 1056-4.

### 1056-6 GEOCELLS

Geocells will be identified by product labels attached to the geocell wrapping. Unwrap geocells just before use in the presence of the Engineer. Previously opened geocell products will be rejected.

Manufacture geocells from virgin polyethylene resin with no more than 10% rework, also called “regrind”, materials. Use geocells made from textured and perforated HDPE strips with an open area of 10% to 20% and properties that meet Table 1056-5.

<b>Property</b>	<b>Minimum Requirement</b>	<b>Test Method</b>
Cell Depth	4"	N/A
Sheet Thickness	50 mil -5%, +10%	ASTM D5199
Density	58.4 lb/cf	ASTM D1505
Carbon Black Content	1.5%	ASTM D1603 or D4218
ESCR <sup>A</sup>	5000 hr	ASTM D1693
Coefficient of Direct Sliding (with material that meets AASHTO M 145 for soil classification A-2)	0.85	ASTM D5321
Short-Term Seam (Peel) Strength (for 4" seam)	320 lb	USACE <sup>C</sup> Technical Report GL-86-19, Appendix A
Long-Term Seam (Hang) Strength <sup>B</sup> (for 4" seam)	160 lb	

**A.** Environmental Stress Crack Resistance.

**B.** Minimum test period of 168 hr with a temperature change from 74°F to 130°F in 1-hour cycles.

**C.** US Army Corps of Engineers.

Provide geocell accessories (e.g., stakes, pins, clips, staples, rings, tendons, anchors, deadmen, etc.) recommended by the Geocell Manufacturer.

**PERMANENT SEEDING AND MULCHING:**

(7-1-95)

1660

SP16 R02

The Department desires that permanent seeding and mulching be established on this project as soon as practical after slopes or portions of slopes have been graded. As an incentive to obtain an early stand of vegetation on this project, the Contractor's attention is called to the following:

For all permanent seeding and mulching that is satisfactorily completed in accordance with the requirements of Section 1660 in the *2012 Standard Specifications* and within the following percentages of elapsed contract times, an additional payment will be made to the Contractor as an incentive additive. The incentive additive will be determined by multiplying the number of acres of seeding and mulching satisfactorily completed times the contract unit bid price per acre for Seeding and Mulching times the appropriate percentage additive.

<b>Percentage of Elapsed Contract Time</b>	<b>Percentage Additive</b>
0% - 30%	30%
30.01% - 50%	15%

Percentage of elapsed contract time is defined as the number of calendar days from the date of availability of the contract to the date the permanent seeding and mulching is acceptably completed divided by the total original contract time.



**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:

<u>Restricted Noxious Weed</u>	<u>Limitations per Lb. Of Seed</u>	<u>Restricted Noxious Weed</u>	<u>Limitations per Lb. of Seed</u>
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.



**RESPONSE FOR EROSION CONTROL:****Description**

Furnish the labor, materials, tools and equipment necessary to move personnel, equipment, and supplies to the project necessary for the pursuit of any or all of the following work as shown herein, by an approved subcontractor.

<b>Section</b>	<b>Erosion Control Item</b>	<b>Unit</b>
1605	Temporary Silt Fence	LF
1606	Special Sediment Control Fence	LF/TON
1615	Temporary Mulching	ACR
1620	Seed - Temporary Seeding	LB
1620	Fertilizer - Temporary Seeding	TN
1631	Matting for Erosion Control	SY
SP	Coir Fiber Mat	SY
1640	Coir Fiber Baffles	LF
SP	Permanent Soil Reinforcement Mat	SY
1660	Seeding and Mulching	ACR
1661	Seed - Repair Seeding	LB
1661	Fertilizer - Repair Seeding	TON
1662	Seed - Supplemental Seeding	LB
1665	Fertilizer Topdressing	TON
SP	Safety/Highly Visible Fencing	LF
SP	Response for Erosion Control	EA

**Construction Methods**

Provide an approved subcontractor who performs an erosion control action as described in the NPDES Inspection Form SPPP30. Each erosion control action may include one or more of the above work items.

**Measurement and Payment**

*Response for Erosion Control* will be measured and paid for by counting the actual number of times the subcontractor moves onto the project, including borrow and waste sites, and satisfactorily completes an erosion control action described in Form 1675. The provisions of Article 104-5 of the *Standard Specifications* will not apply to this item of work.

DN00545

EC-2

Cherokee

Payment will be made under:

**Pay Item**

Response for Erosion Control

**Pay Unit**

Each

**PROJECT SPECIAL PROVISIONS**

**REST AREA RENOVATION**

# STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION



## DIVISION FOURTEEN

County: CHEROKEE

Contract No.: 6300042569

WBS Element: 51213.011

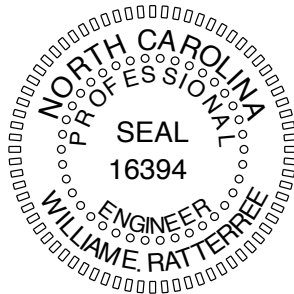
State ID #: 16-16033-01A

Description: CHEROKEE COUNTY REST AREA RENOVATION  
US 19 / 74  
Andrews, NC

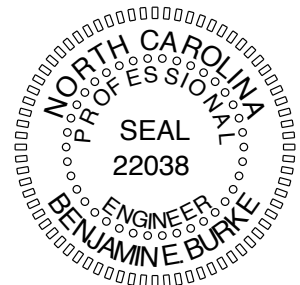
Architect	Structural Engineer	Plumbing, Mechanical & Electrical Engineer
Weeks Turner Architecture, PA Ginger Anderson, Architect 3305-109 Durham Dr. Raleigh, NC 27603 (919) 779-9797 Corp . Cert. 549	Bill Ratterree, PE 1150 W. Dodson Mill Rd Pilot Mtn, NC (919) 210-1839	Burke Design Group, PA Ben Burke, PE 3305-109 Durham Dr. Raleigh, NC 27603 (919) 771-1916 Corp. License C-2652



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*Ginger S Anderson*  
10/19/2016 10 / 1602313562C422...



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*Bill Ratterree*  
10/12/2016 B77135077441440...



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*Ben Burke*  
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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 Forms: Use AIA original current editions of G702, Application and Certificate for Payment, and AIA G703, Continuation Sheet.
- B. Preparation of Applications for Payment: Complete form entirely.
  - 1. Make current application consistent with previous applications, certificates for payment, and payments made.
  - 2. Base application on current schedule of values and contractor's construction schedule.
  - 3. Include amounts of modifications issued before the end of the construction period covered by the application.
  - 4. Include signature by person authorized by the contractor to sign legal documents.

5. Notarize each copy.
  6. Submit in 5 copies.
  7. Attach revised schedule of values, if changes have occurred, unless application forms already show entire schedule of values.
  8. Attach copy of the owner's agreement to pay for materials and equipment stored off site, and any other supporting documentation required by the owner or the contract documents.
- C. 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.
- D. Transmit application for payment with a transmittal form itemizing supporting documents attached.
1. Transmit to the Architect/Engineer.

### **3.03 FIRST PAYMENT PROCEDURE**

- A. The first application for payment will not be reviewed until the following submittals have been received:
1. Certificates of insurance.
  2. Performance and payment bonds.
  3. Schedule of values.
  4. List of subcontractors, principal suppliers, and fabricators.
  5. Contractor's construction schedule. Monthly Progress Schedules are required, see Section 01200.
  6. Names of the contractor's principal staff assigned to the project.
  7. 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.
  2. Final Inspection list of incomplete work.
  3. 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.
  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.
- F. Project Closeout-items to be received prior to issuance of Substantial Completion
  1. As Built drawings-final drawings red marked as needed with field changes.
  2. Operations and Maintenance manuals
  3. Warranty information
  4. A final Subcontractor list
  5. Maintenance stock items' spare parts' special tools as required

## **END OF SECTION 01026**

# SECTION 01100- COMPENSATION FOR GENERAL CONSTRUCTION

HIGHWAY US-19/74            REST AREA  
OCTOBER 2016  
CHEROKEE COUNTY, NORTH CAROLINA

## 1.1 COMPENSATION

- A. The work of furnishing all materials and constructing/renovating the existing Rest Area Building, demolition of existing Decks/Ramps and construction of new Decks/Ramps, reroofing and painting the Storage Building and Picnic Shelters and painting all of the existing outside Site Light Poles and the demolition and removal of the existing Concrete H/C Access Ramp. All work shall be in accordance with the plans and specifications, completed and accepted, and will be paid for at the contract lump sum price for the "General Construction Rest Area Building". Such price and payment will be full compensation for all work of constructing/renovating the existing Rest Area Building, demolition of existing Decks/Ramps and construction of new Decks/Ramps, reroofing and painting the Storage Building and Picnic Shelters and painting all of the existing outside Site Light Poles and the demolition and removal of the existing Concrete H/C Access Ramp. 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 Renovation Rest Area Building".....Lump Sum

HIGHWAY US-19/74 REST AREA  
OCTOBER 2016  
CHEROKEE 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 Install 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 well as the storage building yard hydrant, 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 Install Rest Area Building".....Lump Sum

HIGHWAY US-19/74 REST AREA  
OCTOBER 2016  
CHEROKEE 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 Install 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 Install Rest Area Building".....Lump Sum

HIGHWAY US-19/74 REST AREA  
OCTOBER 2016  
CHEROKEE 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 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 "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 and Storage 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 Install Rest Area Building" .....Lump Sum

**1.2 UNIT COST PAY ITEMS**

See Section 0200 Rest Area Site Work for additional items.

# 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)
  3. Contractor's Construction Waste and Recycling Plan must be approved by the Architect prior to the start of Work.
  4. 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.

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.

**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 01151**

## **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 Highway Division 1 Roadside 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.

- 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.

- 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.

- 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.



**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 01600 -SUBSTITUTION PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. Section includes Substitution Bid and Submittal Process.

#### **1.2 SUBSTITUTION REQUIREMENTS**

- A. When material, article, or method is specified using name of proprietary product manufacturer, vendor, or method followed by phrase "or equal," specific item mentioned establishes basis upon which bids are to be prepared.
  - 1. Other manufacturers' materials, articles, and methods not named will be considered as substitutions provided required information is submitted on "FORM FOR SUBSTITUTIONS FOR SPECIFIED ITEMS" and will not require substantial revisions of Contract Documents.
  - 2. This applies to specific construction methods when required by Contract Documents.
- B. Whenever material, article, or method is specified or described without phrase "or equal," no substitutions will be allowed.
- C. Cost for redesigns due to substituted items are responsibility of Contractor.
- D. Bidder represents the following in making their request for substitution(s).
  - 1. Has personally investigated proposed product or method and determined it is equal in all respects to that specified.
  - 2. Will furnish same guarantee for substitution as for product or method specified.
  - 3. Will coordinate installation of accepted substitution into Work, making design and construction changes to complete Work in all respects following Contract requirements without additional cost to the Commission.
- E. Request for substitutions received after bids are open will not be considered except as stated herein.

#### **1.3 SUBMITTAL OF DATA FOR PROPOSED SUBSTITUTIONS**

- A. In order for substitutions that do not change design intent to be considered, submit no later than 30 days after date of Notice to Proceed, 3 copies of complete data set forth herein to permit complete analysis of proposed substitutions
  - 1. For Products.
    - a. Identification including manufacturer's name and address.
    - b. Manufacturer's literature, including but not necessarily limited to:
      - 1) Product description, performance, and test data.
      - 2) Reference standards.
    - c. Samples where appropriate.
    - d. Name and address of similar projects on which product was used and dates of installation with contact name and telephone number.
  - 2. For Construction Methods.
    - a. Detailed description of proposed method.
    - b. Drawings illustrating methods.
    - c. Name and address of similar projects on which method was used and dates of use with contact name and telephone number.
  - 3. Comparison of proposed substitution with product or method specified.
  - 4. Data relating to impact on construction schedule by proposed substitution.
  - 5. Impact on other contracts.

**1.4 SUBSTITUTIONS RECEIVED AFTER 30 DAYS AFTER NOTICE**

- A. No request for substitutions submitted after 30 days after Notice to Proceed will be considered unless following evidence is submitted to the Architect.
  - 1. Specified material or method is unavailable, due to cause(s) stated in General Conditions, Article 15.5.1.
    - a. Submit data to permit complete analysis of the proposed substitution.

**1.5 APPROVAL OF SUBSTITUTION**

- A. Architect/Engineer's decision regarding evaluation of substitutions will be final and binding.
- B. Request for time extensions and additional costs based on submission, acceptance, or rejection of substitutions will be evaluated following Contract Documents.
- C. All approved substitutions will be incorporated into Contract by Change Order.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**PART 4 - MEASUREMENT AND PAYMENT**

- 1.1 Providing for and complying with requirements in this Section will not be measured for payment, but cost will be considered incidental to Contract.

## SECTION 02000 – REST AREA SITE WORK

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## **LANDSCAPE GRADING**

### **General**

Landscape and Site grading consists of placing topsoil material and cutting and backfilling around buildings, sidewalks, etc., to provide proper drainage and elevations as indicated on the plans, and as directed by the Engineer.

### **Topsoil Material**

Topsoil will be as specified herein and will be utilized for all fill/backfill operations as directed by the Engineer.

Topsoil will be a sandy loam, silt loam or clay loam that contains a reasonable amount of humus material. Topsoil will be of good texture, loose and friable and will be representative of topsoil in the general vicinity. It will be reasonably free from sod, hard lumps, subsoil, large roots, rocks and gravel, noxious weed seeds and/or toxic substances or other material, which would be harmful to plant growth. Topsoil when delivered to the job site will be approved by the Engineer prior to placement, whether or not the source of topsoil has been previously approved.

### **Installation**

Place topsoil fill and spread evenly to a depth as directed by the Engineer, which after settlement, constitutes finish grade. Do not place topsoil when the ground is frozen, is excessively wet, or is in a condition that the soil cannot be worked easily and dressed smoothly. Compact all fill material under elevated sidewalks/concrete paving to a density equal to or greater than undisturbed soil in the area.

Where fill material is needed within wooded areas, precautionary measures will be taken to prevent damage to trees and the roots of trees to be retained for landscape purposes. When placing or compacting fill material in or adjacent to wooded areas heavy machinery will not be allowed. Equipment for placing fill material will be approved by the Engineer prior to any grading work.

### **Compensation**

Landscape and Site Grading' will be paid for at the contract lump sum price for the work detailed in this section that has been successfully accomplished and accepted. Building fill will be included as part of the building lump sum payment. 'Topsoil' will be paid for in the actual number of cubic yards of topsoil placed and accepted. Topsoil will be measured by truck measurement. Each truck will be measured and will have a legible identification mark indicating its capacity. Load each truck to at least its measured capacity at the time it arrives at the point of delivery. The recorded capacity will be adjusted by making a 25 percent deduction to allow for shrinkage, and the adjusted capacity will be the quantity to be paid for.

Such price and payment will be full compensation for furnishing, all labor, equipment and all incidentals necessary to complete the work satisfactorily.

**Payment will be made under:**

<b>Landscape Grading</b> .....	<b>LS</b>
<b>Topsoil</b> .....	<b>CY</b>

**POST TOP LIGHT / POLE / FLAGPOLE LIGHTS**

**New Post Top Lights / Pole** - As shown on the plans and as directed by the Engineer, Furnishing and Installation will include, but not be limited to, furnishing new light, and pole, installation of the new light and pole and connecting conductors in conduit to existing or new lighting circuits, as shown on the drawings or as directed by the Engineer.

**Relocate Existing Post Top Lights / Pole** - As shown on the plans and as directed by the Engineer, Relocation will include, but not be limited to, dismantling the light and pole, storing items during construction, reinstallation of the light and pole and connecting to existing or new lighting circuits, as shown on the drawings or as directed by the Engineer.

**New Flagpole Lights** - As shown on the plans and as directed by the Engineer, Furnishing and Installation will include, but not be limited to, furnishing new lights, installation of the new lights and connecting conductors in conduit to existing or new lighting circuits, as shown on the drawings or as directed by the Engineer.

Installing Post Top Pole - Direct Bury Fiberglass Pole:

Direct bury poles shall be plumbed and securely mounted according to the manufacturer's specifications. Contractor shall intercept existing underground circuit in conduit and connect circuit(s) at new direct bury pole location. The exact new location of Light Poles is to be approved in the field by the Engineer.

Installing Post Top Light Fixtures:

The light fixtures shall be mounted securely to the Tenon at the end of the pole and shall be wired to the feeder circuit at the base of the pole. Contractor shall provide all wiring, ground rod, copper grounding wire to ground rod and provide / install breakaway fuse holder(s) at each pole.

Installing Flag Pole Light Fixtures:

The Flagpole light fixtures shall be mounted on a concrete foundation as recommended by the Manufacturer and shall be wired to the new underground feeder circuit installed by the Contractor. The contractor shall provide the wiring and ground rod and shall provide grounding to ground rod and breakaway fuse holder(s) at each Flagpole light Fixture.

Post Top Light Fixture:

Contractor shall furnish and install Light Emitting Diode (LED) light fixture(s), as follows:

- Cree EDGE Area Light: ARE-EDR-5M-R3-04-D-UL-SV-350-43K  
Specified to match existing lights on site – No Equal

Post Top Light Pole:

Contractor shall furnish / Install Direct Burry Fiberglass Light Pole (16' Above Grade)

- Whatley Fiberglass Pole: TR30-16-DE-GRY-TXT-30  
Or Approved Equal

Flagpole Light Fixture:

The Contractor shall furnish and install Light Emitting Diode (LED) Flagpole light fixture(s), as follows:

- Lithonia Flood Light: DSXF2 LED 4 A530/40K MSP MVOLT THK DNAXD  
Or Approved Equal

Electric Junction Box (in ground):

The Contractor shall furnish and install In Ground Electrical Junction Box's(s), as follows:

- Quazite (gasket, stackable, open bottom, mouse hole) :  
PG1118BB18 (11" x 18" x 18") (Logo-LIGHTING)  
Or Approved Equal- Provide stackable boxes to achieve burry depth.

**Wire / Conductors / Conduit:**

The Contractor shall furnish and install new circuitry from light fixture through pole, and Light Fixture and tie to existing underground circuitry. All conductors shall be copper. Wire and cable shall conform to IPCEA specifications and shall have marks for identification (manufacturer's name, type insulation, and gauge of conductor) and the UL label. All wire insulation shall be rated at 600 VAC or greater. Trenches for electrical Conduit shall be 30" deep and backed filled and tamped in 6" lifts to the approval of the Engineer.

Types of wiring shall be as follows:

Feeder Circuits – UL Type THNN / 1-1/2" PVC Conduit

Branch Circuits in Light Standards - UL Type NM Cable

Grounding Electrode Conductor - ASTM B-2

Equipment Grounding Conductor - Bare Copper MHD Solid or Insulated

**Breakaway Fuse holders:**

Fused over current protection shall be provided in the base of each Light Fixture. The breakaway approved fuse holder(s) shall be rated 600 VAC, 30 amp minimum and be waterproof. Fuse holders shall be constructed so that the fuse will be disconnected from the line side power every time the fuse holder is opened. It may be made of molded plastic or rubber and have insulating boots. The terminals shall be specifically rated for the size and number of conductors required.

**Hardware:**

Mounting or attachment hardware including bolts, nuts, washers, wire nuts, clamps, and hangers shall be stainless steel, hot dipped galvanized or of equal corrosion resistance.

**MEASUREMENT AND PAYMENT**

The quantity of furnished and Installed Contract Items to be paid for will be the actual number of Post Top, and Flagpole - LED Light Fixtures – Junction Boxes and the necessary Electrical Lighting Circuits underground in conduit and the necessary time expended locating existing Lighting Circuits – all which have been furnished and delivered to the site Installed successfully and accepted by the Engineer.

The Furnished and Installed and measured in place - number of Post Top, and Flagpole - LED Light Fixtures – Electrical Junction Boxes and the necessary new Electrical Lighting Circuits underground in conduit as provided above and described in this contract accepted by the Engineer will be paid for at the contract unit price per each Pay Item as listed below Such price and payment will be considered full compensation for work in this Contract



Payment will be made under:

Furnish /Install - Post Top Light Pole / Fixture .....	Each
Relocate - Post Top Light Pole / Fixture .....	Each
Furnish /Install - Flagpole Light Fixture .....	Each
Furnish /Install - PC-18 Electrical Junction Box .....	Each
Furnish /Install -Electrical Service (#8 AWG, THWN, 2" Conduit).....	Linier Foot

## **FLAGPOLE**

**General:** The work covered by this section consists of furnishing and installing 40' satin finished aluminum flagpole at locations as shown on the drawings.

**Materials:** The flagpoles shall be 40' exposed height (44' overall length) standard cone tapered aluminum flagpoles .Provide a ball bearing revolving truck assembly with a 8" gold anodized ball finial. Provide an aluminum flash collar and all components recommended by the manufacturer for a ground-set installation. Cabling will be set up to hold two flags.

**Installation:** Follow the manufacturer's recommendations concerning ground set mounting for a 80 M.P.H. design a wind load. Coordinate the installation of the flagpole with the placement of the flagpole light and all site work and utilities.

**Compensation:** The Tapered Aluminum Flagpoles will be paid for the contract unit price for each "Flagpole". Such payment will be full compensation for all work covered by this section including, but not limited to, furnishing and installing the flagpole, flash collar, halyard, cleats, flag snaps, and all parts recommended by the manufacturer for a ground-set installation; and all labor, materials and equipment necessary to complete the work.

Payment will be made under:

Flagpole .....	Each
----------------	------

## **SPLIT RAIL FENCE**

**Materials:** Fence posts and rails shall be Locust- Post and Hemlock- Rails. They shall be free of major defects or chips or splinter pieces that may cause injury to pedestrians. Post and rails shall be straight and true to line and grade.

**Installation:** Fence shall be erected as shown on the plans and according to manufacturer’s recommended installation. Post installation shall be set in a concrete collar with an aggregate base set plum. Rails shall be straight and true to line and grade. Installer shall be an experienced fence builder.

Work includes removal and disposal of any existing split rail fencing.

### **Method of Measurement and Basis of Payment:**

The quantity of split rail fencing will be the actual number of linear feet measured along the top rails between post (Approximately 8’) which has been satisfactorily installed and accepted.

The quantity of split rail fencing, measured as specified above, will be paid for at the contract unit price per linear foot for “Split Rail Fencing”. There will be no separate pay item for post or concrete footings. Such prices and payments will be full compensation for furnishing and installing the split rail fencing; including and not limited to all materials, labor, and equipment necessary to satisfactorily complete the work, which includes removal and disposal of any existing split rail fencing.

Payment will be made under:

Split Rail Fence . . . . .Linear Feet (LF)

## **4” CONCRETE SIDEWALK**

**General:** The sidewalks indicated on the plans shall be 4" concrete. The sidewalks and patio shall be as specified in Section 848 and as shown on the plans.

Where it is noted on the plans where 4” concrete sidewalk is to meet and/or match existing concrete sidewalk. Install sidewalk according plans, details and specifications. The existing sidewalk shall have a clean saw cut edge provided, at the match locations and/or where concrete paving is removed.

Scoring patterns shall be as shown on plans or as directed by the Engineer in field, and as specified in Section 825-10. Control joints indicated on plans shall be as specified for Grooved Contraction Joints.

**Method of Measurement and Basis of Payment**

The quantities of sidewalk to be paid for will be the actual number of square yards measured along the surface which have been completed and accepted. The quantity of sidewalk measured as indicated above, will be paid for at the contract unit price per square yard for "4" Concrete Sidewalk". There will be no additional compensation for control and expansion joints as directed by the Engineer.

Payment will be made under:

4" Concrete Sidewalk . . . . . SY

**CONCRETE CURB RAMP**

**General:** The depressed curb will be constructed at locations shown on the plans, as indicated in the details and as described herein. All applicable sections of the Standard Specifications Section 825, Incidental Concrete Construction - General and Section 848, Concrete Sidewalks, Driveways and Wheelchair Ramps, will apply. Place joints as shown in the scoring pattern on the plans and as specified in Section 825 of the Standard Specifications. The sidewalk curb height will transition on a smooth curve from a 6" height to flush with gutter. The area that is flat and flush with gutter will be a minimum of 3' in width. Sidewalk will warp to meet curb height on each end of depression. The transition from parking lot elevation to adjacent sidewalk elevation will be a smooth and continuous slope.

**NOTE: Removal /Disposal of the Existing Curb Ramp Shall be considered part of the demolition work in the General Building Renovation Pay Item.**

**Method of Measurement and Basis of Payment:** The quantity of depressed curb to be paid for will be the actual number of each depressed curb furnished, installed, and accepted. This will be full compensation for all work covered by this section including but not limited to furnishing and installing concrete and other incidental material, and all labor, tools, and equipment necessary to complete the work.

*Payment will be made under:*

**Concrete Curb Ramp.....EA**

## **TEMPORARY EROSION CONTROL**

### **SECTION 1605 TEMPORARY SILT FENCE**

Furnish material, construct, maintain and remove temporary silt fence in locations shown in the plans or in locations that require surface drainage to be filtered.

#### **MATERIALS**

Refer to Division 10.

<b>Item</b>	<b>Section</b>
Geotextile, Type 3	1056

#### **(A) Posts**

Provide steel posts with at least 5 ft long, 1 3/8" wide measured parallel to the fence and 1.25 lb/ft in weight per length. Equip with an anchor plate with an area of at least 14.0 sq.in. Ensure a means of retaining fencing material in the desired position without displacement.

#### **(B) Woven Wire Fence**

Provide woven wire fence at least 32" high with 5 horizontal wires, vertical wires spaced 12" apart, 10 gauge top and bottom wires and 12 1/2 gauge for all other wires.

#### **(C) Attachment Device**

Provide No. 9 staple with at least 1 1/2" length or other approved attachment device.

#### **CONSTRUCTION METHODS**

Install in locations as shown in the plans or as directed.

Install wire and geotextile as shown in *Roadway Standard Drawings*.

Geotextile may be used without the woven wire fence backing under the following conditions:

(A) The Engineer will approve the geotextile.

(B) Incline post spacing toward the runoff source, at an angle of not more than 20° from vertical.

(1) Attach geotextile to the post with wire or other acceptable methods.

(2) Overlap geotextile at least 18" at splice joints.

- (3) Install geotextile that is free of defects, rips, holes, flaws, deterioration or damage.

**MAINTENANCE AND REMOVAL**

Maintain the silt fence until the project is accepted or until the fence is removed. Remove and replace deteriorated or ineffective geotextile. Remove and dispose of silt accumulations in accordance with Section 1630 when necessary or as directed.

Leave silt fence in place until site stabilization and remove at project completion. Removed silt fence becomes the property of the Contractor. Dress and seed and mulch all areas where silt fence is removed in accordance with Section 1660.

**MEASUREMENT AND PAYMENT**

*Temporary Silt Fence* will be measured and paid in linear feet, accepted in place, along the ground line of the fence.

*Silt Excavation* will be measured and paid in accordance with Section 1630.

*Seeding and Mulching* will be measured and paid in accordance with Section 1660.

Article 104-5, pertaining to revised contract prices, will not apply to this item. No revision in the contract unit price will be allowed because of any overrun or underrun.

Payment will be made under:

<b>Pay Item</b>	<b>Pay Unit</b>
Temporary Silt Fence	Linear Foot

**SECTION 1606  
SPECIAL SEDIMENT CONTROL FENCE**

Furnish materials, construct, maintain and remove special sediment control fence. Place special sediment control fence as shown in the plans or as directed.

**1 MATERIALS**

Refer to Division 10.

<b>Item</b>	<b>Section</b>
Sediment Control Stone, Standard Size No. 5 or 57	1005

**(A) Posts**

Provide steel posts in accordance with Subarticle 1605-2(A).

**(B) 1/4" Hardware Cloth**

Provide hardware cloth with 1/4" openings constructed from 24 gauge wire.

**(C) Attachment Device**

Provide No. 9 staple with at least 1 1/2" length or other approved attachment device.

Error! Style not defined.-2 **CONSTRUCTION METHODS**

Install hardware cloth and sediment control stone in accordance with *Roadway Standard Drawings* No. 1606.01. Attach hardware cloth to post with wire staple or other acceptable methods.

Maintain the special sediment control fence until the project is accepted or until the fence is removed. Remove and dispose of silt accumulations at the fence when so directed in accordance with Section 1630.

**MEASUREMENT AND PAYMENT**

*Silt Excavation* will be measured and paid in accordance with Section 1630.

*1/4" Hardware Cloth* will be measured and paid in accordance with Article 1632-5.

*Sediment Control Stone* will be measured and paid in accordance with Article 1610-4.

**STABILIZATION REQUIREMENTS:**

(3-11-2016)

Stabilization for this project shall comply with the time frame guidelines as specified by the NCG-010000 general construction permit effective August 3, 2011 issued by the North Carolina Department of Environment and Natural Resources Division of Water Quality. Temporary or permanent ground cover stabilization shall occur within 7 calendar days from the last land-disturbing activity, with the following exceptions in which temporary or permanent ground cover shall be provided in 14 calendar days from the last land-disturbing activity:

- Slopes between 2:1 and 3:1, with a slope length of 10 ft. or less
- Slopes 3:1 or flatter, with a slope of length of 50 ft. or less
- Slopes 4:1 or flatter

The stabilization timeframe for High Quality Water (HQW) Zones shall be 7 calendar days with no exceptions for slope grades or lengths. High Quality Water Zones (HQW) Zones are defined by North Carolina Administrative Code 15A NCAC 04A.0105 (25). Temporary and permanent ground cover stabilization shall be achieved in accordance with the provisions in this contract and as directed.

**SEEDING AND MULCHING:****(WestEd)**

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

## Shoulder and Median Areas

**August 1 - June 1**

20#	Kentucky Bluegrass
75#	Hard Fescue
25#	Rye Grain
500#	Fertilizer
4000#	Limestone

**May 1 - September 1**

20#	Kentucky Bluegrass
75#	Hard Fescue
10#	German or Browntop Millet
500#	Fertilizer
4000#	Limestone

## Areas Beyond the Mowing Pattern, Waste and Borrow Areas:

**August 1 - June 1**

100#	Tall Fescue
15#	Kentucky Bluegrass
30#	Hard Fescue
25#	Rye Grain
500#	Fertilizer
4000#	Limestone

**May 1 - September 1**

100#	Tall Fescue
15#	Kentucky Bluegrass
30#	Hard Fescue
10#	German or Browntop Millet
500#	Fertilizer
4000#	Limestone

## Approved Tall Fescue Cultivars

06 Dust	Escalade	Justice	Serengeti
2 <sup>nd</sup> Millennium	Essential	Kalahari	Shelby
3 <sup>rd</sup> Millennium	Evergreen 2	Kitty Hawk 2000	Sheridan
Apache III	Falcon IV	Legitimate	Signia
Avenger	Falcon NG	Lexington	Silver Hawk
Barlexas	Falcon V	LSD	Sliverstar
Barlexas II	Faith	Magellan	Shenandoah Elite
Bar Fa	Fat Cat	Matador	Sidewinder
Barrera	Festnova	Millennium SRP	Skyline
Barrington	Fidelity	Monet	Solara
Barrobusto	Finelawn Elite	Mustang 4	Southern Choice II
Barvado	Finelawn Xpress	Ninja 2	Speedway
Biltmore	Finesse II	Ol' Glory	Spyder LS
Bingo	Firebird	Olympic Gold	Sunset Gold

Bizem	Firecracker LS	Padre	Taccoa
Blackwatch	Firenza	Patagonia	Tanzania
Blade Runner II	Five Point	Pedigree	Trio
Bonsai	Focus	Picasso	Tahoe II
Braveheart	Forte	Piedmont	Talladega
Bravo	Garrison	Plantation	Tarheel
Bullseye	Gazelle II	Proseeds 5301	Terrano
Cannavaro	Gold Medallion	Prospect	Titan ltd
Catalyst	Grande 3	Pure Gold	Titanium LS
Cayenne	Greenbrooks	Quest	Tracer
Cessane Rz	Greenkeeper	Raptor II	Traverse SRP
Chipper	Gremlin	Rebel Exeda	Tulsa Time
Cochise IV	Greystone	Rebel Sentry	Turbo
Constitution	Guardian 21	Rebel IV	Turbo RZ
Corgi	Guardian 41	Regiment II	Tuxedo RZ
Corona	Hemi	Regenerate	Ultimate
Coyote	Honky Tonk	Rendition	Venture
Darlington	Hot Rod	Rhambler 2 SRP	Umbrella
Davinci	Hunter	Rembrandt	Van Gogh
Desire	Inferno	Reunion	Watchdog
Dominion	Innovator	Riverside	Wolfpack II
Dynamic	Integrity	RNP	Xtremegreen
Dynasty	Jaguar 3	Rocket	
Endeavor	Jamboree	Scorpion	

## Approved Kentucky Bluegrass Cultivars:

4-Season	Blue Velvet	Gladstone	Quantum Leap
Alexa II	Blueberry	Granite	Rambo
America	Boomerang	Hampton	Rhapsody
Apollo	Brilliant	Harmonie	Rhythm
Arcadia	Cabernet	Impact	Rita
Aries	Champagne	Jefferson	Royce
Armada	Champlain	Juliet	Rubicon
Arrow	Chicago II	Jump Start	Rugby II
Arrowhead	Corsair	Keeneland	Shiraz
Aura	Courtyard	Langara	Showcase
Avid	Delight	Liberator	Skye
Award	Diva	Madison	Solar Eclipse
Awesome	Dynamo	Mercury	Sonoma
Bandera	Eagleton	Midnight	Sorbonne
Barduke	Emblem	Midnight II	Starburst
Barnique	Empire	Moon Shadow	Sudden Impact
Baroness	Envicta	Moonlight SLT	Total Eclipse



Barrister	Everest	Mystere	Touche
Barvette HGT	Everglade	Nu Destiny	Tsunami
Bedazzled	Excursion	NuChicago	Unique
Belissimo	Freedom II	NuGlade	Valor
Bewitched	Freedom III	Odyssey	Voyager II
Beyond	Front Page	Perfection	Washington
Blacksburg II	Futurity	Pinot	Zinfandel
Blackstone	Gaelic	Princeton 105	
Blue Note	Ginney II	Prosperity	

Approved Hard Fescue Cultivars:

Aurora II	Eureka II	Oxford	Scaldis II
Aurora Gold	Firefly	Reliant II	Spartan II
Berkshire	Granite	Reliant IV	Stonehenge
Bighorn GT	Heron	Rescue 911	
Chariot	Nordic	Rhino	

On cut and fill slopes 2:1 or steeper add 20# Sericea Lespedeza and 15# Crown Vetch January 1 - December 31.

The Crown Vetch Seed should be double inoculated if applied with a hand seeder. Four times the normal rate of inoculant should be used if applied with a hydroseeder. If a fertilizer-seed slurry is used, the required limestone should also be included to prevent fertilizer acidity from killing the inoculant bacteria. Caution should be used to keep the inoculant below 80° F to prevent harm to the bacteria. The rates and grades of fertilizer and limestone shall be the same as specified for *Seeding and Mulching*.

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

## **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 but not limited to roof 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, plumbing, mechanical heating and cooling equipment, electrical systems.
    - a. Site Clearing including sidewalks, ramps, foundations, 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 items.
    - a. Removal of existing small shrubbery (may be by NCDOT, Division 14).

#### **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.

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.
- C. Protect existing to remain items that may be exposed during demolition process.

### **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.

**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 02200 - EARTHWORK**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Earth moving and excavation.
  - 2. Grading.
  - 3. Backfilling.
  - 4. Filling.
  - 5. Compacting.

#### **1.02 SUBMITTALS**

- A. Test Reports: NCDOT testing laboratory will submit the following reports directly to the Engineer and shall copy the contractor:
  - 1. Analysis of soil materials, whether procured on or off site, and including fill, backfill, and borrow materials.
  - 2. Verification of each footing subgrade.
  - 3. Moisture-density relationship test reports.
  - 4. Compressive strength or bearing test reports.

#### **1.03 QUALITY ASSURANCE**

- A. Testing Laboratory Services:
  - 1. The Owner, NCDOT, Division 14, will provide services to classify new structural fill soil materials, to recommend and to classify proposed borrow materials when necessary, to verify compliance of materials with specified requirements, and to perform required field and laboratory testing.

#### **1.04 SITE CONDITIONS**

- A. Traffic: The construction site will be open to the contractor for use at all times.
- B. Site Utilities:
  - 1. Advise utility companies of excavation activities before starting excavations. Locate and identify underground utilities passing through work area before starting work.
- C. The construction site is partially in a floodway. The work in the floodway and floodplain will be completed by small equipment (ex. supermini excavator) and removed from the floodway when not in use. The equipment will be stored in the truck parking area during construction and will be removed if the threat of flooding is imminent.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Topsoil: Friable clay loam surface soil.
- B. Satisfactory Topsoil: Fertile agricultural soil, typical for locality, capable of sustaining vigorous plant growth; free of subsoil, rocks larger than 2 inches in diameter, clay, toxic matter, plants, weeds, and roots.
- C. Any structural fill or backfill placed at the site shall utilize a low plasticity soil (liquid limit less than 50, plasticity index less than 25) free of organic material or debris. All fill shall be placed in 8 to 10 inch loose lifts and shall be compacted to at least 95 percent of the standard Proctor maximum dry density (ASTM D 698). The soils shall be aerated or moistened as necessary to maintain the moisture content within 3 percentage points of optimum moisture content.

- D. Capillary Water Barrier: Clean, crushed rock or gravel or uncrushed gravel; 100 percent passing a 1-1/2-inch sieve; not more than 2 percent passing a No. 4 sieve.
- E. Subbase Material: Well-graded, clean, sound, durable particles of crushed stone, crushed blast furnace slag, or crushed gravel, and screenings. Obtain the Engineer's approval of source, quality, and gradation.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Protection: Provide markers indicating limits of work and clear identification of items and areas requiring protection.
- B. Provide barricades, warning signs, and warning lights around open excavations as necessary to prevent injury to persons.

### **3.02 PROTECTION OF TREES**

- A. Provide temporary guards to protect trees and vegetation to remain. Place guards so as to prevent all forms of vehicular traffic or parking within drip lines.
- B. Promptly repair any damaged trees to prevent death or loss of vigor.

### **3.03 CLEARING AND GRUBBING**

- A. Remove dredge material from site and replace with approved structural fill per Roadway's requirement before excavating for the building footings.

### **3.04 DEWATERING**

- A. Do not allow surface or ground water to flow into or accumulate in excavations.

### **3.05 EXCAVATION**

- A. General: Excavation includes the removal of any materials necessary to achieve the required subgrade elevations and includes reuse or disposal of such materials.
- B. Excavation for Structures:
  - 1. Excavate beyond footings and foundations so as to allow proper construction and inspection of concrete formwork and other materials. Excavate to the required elevation.
- C. Excavation for Footings and Foundations:
  - 1. Delay excavation to final grade and final compaction until just before concrete will be placed.

### **3.06 STORAGE**

- A. Stockpile materials to be used for filling and backfilling, including excavated materials classified as satisfactory soil materials, at locations indicated or as directed. Stockpile in a manner to freely drain surface water; cover if necessary to prevent wind-blown dust.

### **3.07 BACKFILLING**

- A. Installation: Place approved soil materials in layers to required elevations.

- B. Installation: Place satisfactory soil materials in layers to required subgrade elevations.

### **3.08 FILLING**

- A. Preparation: Verify that area has been stripped of vegetation including roots below grade. Remove and dispose of any unsatisfactory soils.
  - 1. When filling slopes steeper than 1 in 4 rise, plow, step, or break up surfaces to promote bond of new to existing material.
- B. Installation: Place fill materials to required elevations in lifts of required depth. Provide fill materials beneath each area as indicated.
  - 1. Building slabs: Capillary water barrier material.

### **3.09 BUILDING SLAB AREAS**

- A. Place fill or backfill lifts such that compaction true to grade and level is accomplished with a minimum of surface disturbance and segregation or degradation of materials. Maintain grade control and cross section by means of line and grade stakes. Maintain moisture content within prescribed limits during placing and compacting.
  - 1. Capillary water barrier: Under slabs on grade, place capillary water barrier material directly on subgrade, shape surface to within the required tolerances and compact.

### **3.10 COMPACTION**

- A. Place material simultaneously on opposite sides of walls, small structures, utility lines, etc. to avoid displacement or overstressing.
- B. In-Place Density Requirements: Compact soil to not less than the values given below, expressed as a percentage of maximum density at optimum moisture content.
  - 1. Exterior steps and ramps: Top 8 inches of subgrade and subsequent lifts: 95 percent.
  - 2. Building slabs and structures: Top 12 inches of subgrade and subsequent lifts: 95 percent.

### **3.11 GRADING**

- A. General: Smooth grade to a uniform surface that complies with compaction requirements and required lines, grades, and cross sections and is free from irregular surface changes.

### **3.12 FIELD QUALITY CONTROL**

- A. Testing Laboratory Services: Provide timely notice to testing laboratory. Do not proceed with construction until testing of each subgrade and lift of fill or backfill has been performed and required inspections and approvals have been obtained.
- B. Maximum Density at Optimum Moisture Content: Determine in accordance with ASTM D 698.
  - 1. For each subgrade, fill, and backfill material, perform one moisture-density relationship test for each 1500 cubic yards, or fraction thereof, of material used.
- C. If testing service reports indicate that subgrade or fills are below specified density, scarify or remove and replace to the required depth, re-compact, and retest at no cost to the owner.

### **3.13 MAINTENANCE**

- A. Completed Areas: Protect from damage by pedestrian or vehicular traffic, freezing, erosion, and contamination with foreign materials.

### **3.14 DISPOSAL OF EXCESS AND WASTE MATERIALS**



- A. Stockpile any excess satisfactory topsoil in locations on site as directed by the Engineer.
- B. Stockpile or spread any excess satisfactory soil in location on site as directed by the Engineer.
- C. Remove any unsatisfactory soil, trash, debris, and other materials not required for use on the project and legally dispose of it off the owner's property.
- D. On-site burning is not permitted.

**END OF SECTION 02200**

## **SECTION 02280 - SOIL TREATMENT**

### **PART 1 GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Subterranean termite prevention treatment of soil areas scheduled to receive new construction.
  - 2. Subterranean termite prevention treatment of existing foundations to remain.

#### **1.02 SUBMITTALS**

- A. Product Data: Submit product label or accompanying labeling in accordance with the Federal Insecticide, Fungicide, and Rodenticide Act.
- B. Quality Control Submittals:
  - 1. Certificates: Evidence of installer's authorization to apply products under applicable state and local law.
  - 2. Manufacturer's instructions: Submit manufacturer's directions for use.
- C. Contract Closeout Submittals:
  - 1. Project record documents:
    - a. Submit a certificate signed by installer and contractor stating that treatment has been applied in accordance with applicable governing regulations and in accordance with this specification.
    - b. Incorporate into the certificate or attach thereto a plan drawing indicating actual application locations and, for each location, noting methods and rates of application and including typical sections or details where necessary for clarity.
  - 2. Warranty.

#### **1.03 QUALITY ASSURANCE**

- A. Installer Qualifications:
  - 1. Licensed to install specified products in the state in which the project is located and in the local jurisdiction.
  - 2. A company installing products of this section and whose installations have performed in a satisfactory manner under comparable conditions for a period of 5 years.
- B. Regulatory Requirements:
  - 1. Comply with applicable pesticide regulations of the state in which the project is located.
  - 2. Comply with applicable local pesticide regulations.

#### **1.04 WARRANTY**

- A. Special Warranty:
  - 1. Submit manufacturer's warranty against infestation of treated areas.
  - 2. Warranty shall not reduce or otherwise limit any other rights to correction which the owner may have under the contract documents.
  - 3. Warranty period: **5 years.**
- B. Correction during the warranty period shall include not less than the following:
  - 1. Retreatment of areas in which evidence of infestation is discovered.

## **PART 2 PRODUCTS**

### **2.01 TERMITICIDE**

- A. Registered with the United States Environmental Protection Agency (EPA) for use as a termiticide under conditions of use prevailing at the project site.
- B. Registered with the applicable authorities in the state in which the project is located and with local governing authorities, as applicable for use as a termiticide under conditions of use prevailing at the project site.

## **PART 3 EXECUTION**

### **3.01 APPLICATION**

- A. Apply termiticide in strict accordance with manufacturer's instructions; treat new entire slab area and perimeter new and existing foundations.
- B. Apply termiticide at the maximum recommended application rates for the respective areas to be treated and methods of treatment used.
- C. Treat the entire structure. Do not leave any portion untreated.
- D. Schedule treatment of new construction to occur when treatment may be applied directly to the soils and surfaces to be treated, and prior to their concealment with subsequent construction.

### **3.02 CLEANING**

- A. Do not allow contamination of surfaces not intended to be treated. Follow manufacturer's instructions to completely remove chemical from surfaces should contamination occur.
- B. Remove from beneath the structure any cellulosic material, wood that is not pressure-preservative treated, and debris. Do not allow non-pressure-preservative treated wood to contact with or remain proximate to soil.

## **END OF SECTION 02280**

## **SECTION 02712 - SUBDRAINAGE SYSTEMS FOR STRUCTURES**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Subdrainage systems of the following types: Downspout drains.
- B. Related Sections: Earthwork: Elsewhere in Division 2 and Landscape Section at the end of the specification.

#### **1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's technical literature and installation instructions for the following:
  - 1. Drainage piping.

### **PART 2 - PRODUCTS**

#### **2.01 DRAINAGE PIPE**

- A. Piping System 1:
  - 1. Standard (solid) pipe: Polyethylene pipe; ASTM F 405 or ASTM F 667, as applicable for pipe size.
  - 2. Application: Gutter and downspout drainage.
- B. Provide fittings and accessories of same material as pipe or compatible material for intersections, bends, transitions, and the like; provide black plastic downspout boots or downspout adapters; equal to Plastic Trends, Royal Pipe Systems, USPlastic, or Flex-Drain or approved equal.

### **PART 3 - EXECUTION**

#### **3.01 PREPARATION**

- A. Engineering Layout: Establish lines, grades, and locations of piping and accessories.
  - 1. Maintain grade stakes, batter boards, and the like, to permit rapid checking of grades and lines as work progresses.

#### **3.02 INSTALLATION - GENERAL**

- A. Earthwork and Trenching: Perform required excavation, backfilling, and compacting in accordance with requirements of other Division 2 sections as applicable.
- B. Piping Installation:
  - 1. General: Install piping in accordance with governing authorities, except where more stringent requirements are indicated.
  - 2. Inspect piping before installation to detect apparent defects. Mark defective materials and promptly remove from site.
  - 3. Lay piping, beginning at low point of system, true to line and grade indicated and with unbroken continuity of invert.
  - 4. Polyethylene pipe: Install in accordance with ASTM F 449.
  - 5. Joint adapters: Make joints between different types of pipe or different diameters of the same type of pipe with standard manufactured adapters intended for that purpose.

- C. Filling and Backfilling:
  - 1. Place and compact fill or backfill in uniform layers, and achieve required compaction.
  - 2. Take care when backfilling to avoid damaging or dislodging drainage system components.

### **3.04 FIELD QUALITY CONTROL**

- A. Piping: After installation of piping and placement of initial backfill, test piping for crushing and obstructions.
  - 1. Pull a mandrel with diameter of 90 percent of the pipe diameter through the pipe.
  - 2. Locate and replace damaged pipe or remove obstructions and retest until mandrel passes entire length of pipe.

**END OF SECTION 02712**

## **SECTION 03300 – CAST IN PLACE CONCRETE**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes: Cast-in-place concrete and concrete curing.
  - 1. Sidewalks, see Roadside Environmental concrete section.
  - 2. Foundations, footings and slabs.

#### **1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data / Mix Design to the Resident Engineer:
  - 1. Concrete mix, reinforcing, admixtures and curing compound.

#### **1.03 QUALITY ASSURANCE**

- A. Codes and Standards: Comply with the following documents, except where requirements of the contract documents or of governing codes and governing authorities are more stringent:
  - 1. Sidewalks, curb ramps, steps, curb & gutters, and parking lot paving shall comply with **NCDOT Standard Specifications** dated January 2012, Divisions 7 and 8; Sections 710, 846 and 848; Class "A" concrete for Portland Cement Production and Delivery.
  - 2. ACI 301 & ACI 318.
- B. Testing Agency Services:
  - 1. NCDOT's testing agency will conduct tests and perform other services specified for quality control during construction.

### **PART 2 - PRODUCTS**

#### **2.01 CONCRETE MATERIALS**

- A. Portland Cement: ASTM C 150, and as follows:
  - 1. Type I, except where other type is specifically permitted or required.
    - a. Type I may be replaced by Type III (high early strength) for concrete placed during cold weather.
- B. Water: Potable.
- C. Aggregates: Normal weight concrete: ASTM C 33.
- D. Admixtures - General: Admixtures which result in more than 0.1 percent of soluble chloride ions by weight of cement are prohibited.
- E. Air-Entraining Admixture: ASTM C 260 and certified by manufacturer for compatibility with other mix components.
- F. Water-Reducing Admixture: ASTM C 494, Type A.

#### **2.02 MISCELLANEOUS MATERIALS AND ACCESSORIES**

- A. Formwork:
  - 1. Facing Materials: Unexposed finish concrete: Any standard form materials that produce structurally sound concrete.
  - 2. Formwork Accessories:
    - a. Form coating: Form release agent that will not adversely affect concrete surfaces or prevent subsequent application of concrete coatings.
    - b. Metal ties: Commercially manufactured types; cone snap ties, taper removable bolt, or other type which will leave no metal closer than 1-1/2 inches from surface of

concrete when forms are removed, leaving not more than a 1-inch-diameter hole in concrete surface.

- B. Reinforcing Materials:
  - 1. Reinforcing Bars: Provide deformed bars complying with the following, except where otherwise indicated: ASTM A 615, Grade 60.
  - 2. Welded Wire Fabric: ASTM A 185, cold-drawn steel, plain.
  - 3. Tie wire: Black annealed type, 16-1/2 gage or heavier.
  - 4. Supports: Bar supports conforming to specifications of CRSI "Manual of Standard Practice."
- C. Vapor Retarder: Membrane for installation beneath slabs on grade, resistant to decay when tested in accordance with ASTM E 1745, and as follows:
  - 1. 15 mils thick, multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs Single ply polyethylene sheet is prohibited.
- D. Moisture-Retaining Cover: ASTM C 171, and as follows:
  - 1. Polyethylene film.
- E. Liquid Curing Compounds: Comply with ASTM C 309, Type 1 and compatible with flooring.

### **2.03 CONCRETE MIX DESIGN**

- A. Proportioning of Normal Weight Concrete: Comply with recommendations of ACI 211.1.
- B. Specified Compressive Strength  $f'_c$  at 28 Days for Locations as Indicated on Drawings:
  - 1. Footings, walks: 3000 psi., maximum w/c ratio = 0.58
  - 2. Interior Slabs: 4000 psi, maximum w/c ratio = 0.50.
  - 3. Exterior slabs: 4500 psi, maximum w/c ratio = 0.45.
- C. Admixtures:
  - 1. Air-entraining admixture: Use in mixes for exterior exposed concrete unless otherwise specifically indicated. Add at rate to achieve total air content in accordance with Table 1.4.3 of ACI 201.2. For concrete not exposed to exterior, add at rate to achieve total air content between 1 percent and 3 percent.
    - a. Do not use in slabs-on-grade scheduled to receive topping, unless manufacturer of topping recommends use over air-entrained concrete.
  - 2. Water-reducing admixture: Add as required for placement and workability.
  - 3. Do not use admixtures not specified or approved.

## **PART 3 - EXECUTION**

### **3.01 VAPOR RETARDER INSTALLATION**

- A. General: Place vapor retarder sheet over prepared base material, aligning longer dimension parallel to direction of pour and lapped 6 inches. Seal joints with appropriate tape. Cover with sand to depth shown on drawings.

### **3.02 JOINT CONSTRUCTION**

- A. Construction Joints: Locate and install construction joints as indicated on drawings. If construction joints are not indicated, locate in manner which will not impair strength and will have least impact on appearance, as acceptable to the Engineer.
  - 1. Keyways: Provide keyways not less than 1-1/2 inches deep.
  - 2. Reinforcement: Continue reinforcement across and perpendicular to construction joints, unless details specifically indicate otherwise.
- B. Control Joints: Construct contraction joints in slabs poured on grade to form panels of sizes indicated on drawings, but not more than 18 feet apart in either direction.
  - 1. Saw cuts: Form control joints by means of saw cuts one-fourth slab depth.

### **3.03 CONCRETE PLACEMENT**

- A. Inspection: Before beginning concrete placement, inspect formwork, reinforcing steel, and items to be embedded, verifying that all such work has been completed.
  - 1. Wood forms: Moisten immediately before placing concrete in locations where form coatings are not used.
- B. Placement - General: Comply with requirements of ACI 304 and as follows:
  - 1. Schedule continuous placement of concrete to prevent the formation of cold joints.
  - 2. Provide construction joints if concrete for a particular element or component cannot be placed in a continuous operation.
  - 3. Deposit concrete as close as possible to its final location, to avoid segregation.
- C. Placement in Forms: Limit horizontal layers to depths which can be properly consolidated, but in no event greater than 24 inches.
  - 1. Vibrate concrete sufficiently to achieve consistent consolidation without segregation of coarse aggregates.
  - 2. Do not use vibrators to move concrete laterally.
- D. Slab Placement: Schedule continuous placement and consolidation of concrete within planned construction joints.
  - 1. Thoroughly consolidate concrete without displacing reinforcement or embedded items, using internal vibrators, vibrating screeds, roller pipe screeds, or other means acceptable to Engineer.
  - 2. Strike off and level concrete slab surfaces, using highway straightedges, darbies, or bull floats before bleed water can collect on surface. Do not work concrete further until finishing operations are commenced.

### **3.04 FINISHING FORMED SURFACES**

- A. Repairs, General: Repair surface defects, including tie holes, immediately after removing formwork.
  - 1. Smooth rubbed finish: Apply to surfaces indicated no later than 24 hours after form removal.
    - a. Wet concrete surfaces to be finished and rub with Carborundum brick or other abrasive until uniform color and texture are achieved.
    - b. Do not apply separate grout mixture.

### **3.05 FINISHING SLABS**

- A. Finishing Operations - General:
  - 1. Do not directly apply water to slab surface or dust with cement.
  - 2. Use hand or powered equipment only as recommended in ACI 302.1R.
  - 3. Screeding: Strikeoff to required grade and within surface tolerances indicated. Verify conformance to surface tolerances. Correct deficiencies while concrete is still plastic.
  - 4. Bull Floating: Immediately following screeding, bull float or darby before bleed water appears to eliminate ridges, fill in voids, and embed coarse aggregate. Recheck and correct surface tolerances.
  - 5. Final floating: Float to embed coarse aggregate, to eliminate ridges, to compact concrete, to consolidate mortar at surface, and to achieve uniform, sandy texture. Recheck and correct surface tolerances.
  - 6. Troweling: Trowel immediately following final floating. Apply first troweling with power trowel except in confined areas, and apply subsequent trowelings with hand trowels. Wait between trowelings to allow concrete to harden. Do not over trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over it. Consolidate concrete surface by final troweling operation. Completed surface shall be free of trowel marks, uniform in texture and appearance, and within surface tolerance specified.



- a. Grind smooth surface defects which would telegraph through final floor covering system.
- B. Coordinate appearance and texture of required final finishes with the Engineer before application.
- C. Broomed Float Finish: After floating and when water sheen has practically disappeared, apply uniform transverse corrugations approximately 1/16 inch deep, without tearing surface.
- D. Trowel Finish: As specified above.
- E. Trowel and Fine Broom Finish: Follow trowel finishing operation immediately with fine brooming to achieve slightly scarified surface.
- F. Slab Surface Tolerances:
  1. Achieve flat, level planes except where grades are indicated. Slope uniformly to drains.
  2. Floated finishes: Depressions between high spots shall not exceed 5/16 inch under a 10-foot straightedge.
  3. Troweled finishes: Achieve level surface plane so that depressions between high spots do not exceed the following dimension, using a 10-foot straightedge:
    - a. 1/8 inch.
- G. Slab Finish Schedule: Apply finishes in the following typical locations and as otherwise shown on the drawings:
  1. Trowel finish:
    - a. Exposed interior floors not otherwise scheduled.
    - b. Surfaces to receive resilient tile.
  2. Trowel and fine broom: Surfaces to receive terrazzo.
  3. Broom float finish: Exterior slabs and stairs.

### **3.06 CONCRETE CURING AND PROTECTION**

- A. General:
  1. Prevent premature drying of freshly placed concrete, and protect from excessively cold or hot temperatures until concrete has cured.
  2. Provide curing of concrete by one of the methods listed and as appropriate to service conditions and type of applied finish in each case.
- B. Curing Period:
  1. Not less than 7 days for standard cements and mixes.
  2. Not less than 4 days for high early strength concrete using Type III cement.
- C. Formed Surfaces: Cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed.
- D. Surfaces Not in Contact with Forms:
  1. Start initial curing as soon as free water has disappeared, but before surface is dry.
  2. Keep continuously moist for not less than 3 days by uninterrupted use of any of the following:
    - a. Water ponding.
    - b. Water-saturated sand.
    - c. Water-fog spray.
    - d. Saturated burlap: Provide 4-inch minimum overlap at joints.
  3. Begin final curing procedures immediately following initial curing and before concrete has dried.
  4. Continue final curing to end of curing period.
- E. Avoid rapid drying at end of curing period.
- F. Protect slabs during construction process, especially from spillage.

**3.07 QUALITY CONTROL TESTING DURING CONSTRUCTION**

- A. Composite Sampling, and Making and Curing of Specimens: ASTM C 172 and ASTM C 31.
- B. Slump: ASTM C 143. One test per batch.
  - 1. Modify sampling to comply with ASTM C 94.
- C. Air Content of Normal Weight Concrete: ASTM C 173 or ASTM C 231. One test per strength test performed on air-entrained concrete.
- D. Compressive Strength Tests: ASTM C 39.
  - 1. Testing for acceptance of potential strength of as-delivered concrete:
    - a. Obtain samples on a statistically sound, random basis.
    - b. Minimum frequency:
      - 1. One set per 100 cubic yards or fraction thereof for each day's pour of each concrete class.
      - 2. One set per 3500 square feet of slab or wall area or fraction thereof for each day's pour of each concrete class.

**END OF SECTION 03300**

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## **SECTION 04220 – CONCRETE UNIT MASONRY**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Concrete masonry units foundation walls.
  - 2. Mortar and grout, reinforcement, anchorage, and accessories.

### **PART 2 - PRODUCTS**

#### **2.01 CONCRETE MASONRY UNITS**

- A. Concrete Block: Comply with referenced standards for types required to match existing, and as follows:
  - 1. Size: Standard units with nominal dimensions of 16" long, 8" high, and 4", 6" & 8" thick.
  - 2. Special shapes: Provide special block types where required for corners, control joints, headers, lintels, and other special conditions, whether or not specifically indicated on the drawings as special.
    - a. Outside corners: Square-edged units except where otherwise indicated.
  - 3. Hollow load-bearing units: ASTM C 90, and as follows:
    - a. Standard weight.
    - b. Exposed faces: Manufacturer's standard color and texture.

#### **2.02 MORTAR AND GROUT MATERIALS**

- A. Portland Cement: ASTM C 150, Type I.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Aggregate for Mortar: ASTM C 144.
- D. Water: Potable.

#### **2.03 REINFORCEMENT AND ANCHORAGE**

- A. Joint Reinforcement and Anchorage Materials: Comply with the following general requirements for materials required in joint reinforcement and anchorage devices:
  - 1. Steel wire: ASTM A 82.
    - a. Hot-dip galvanizing (after fabrication): ASTM A 153, Class B-2.
      - 1. Use: Exterior locations or in contact with earth.
  - 2. Hot-dip galvanized steel sheet: ASTM A 635 or ASTM A 366; galvanizing in compliance with ASTM A 153, Class B.
    - a. Use: Anchors and miscellaneous sheet metal in masonry accessories at exterior exposures.
- B. Joint Reinforcement: Welded-wire units prefabricated into straight lengths of not less than 10 feet, with deformed continuous side rods and plain cross rods.
  - 1. Width: Approximately two inches less than nominal wall width, providing not less than 5/8 inch mortar coverage on exterior exposures and 1/2 inch elsewhere.
  - 2. Wire sizes:
    - a. Side rod diameter: 0.1483 inch.
    - b. Cross rod diameter: 0.1483 inch.
  - 3. Configuration:

- a. Applications of single unit width: Ladder design, cross rods at not more than 16 inches on center.
- b. Corners: Prefabricated L- and T-shaped units.

#### **2.04 MISCELLANEOUS MASONRY ACCESSORIES**

- A. Bond Breaker Strips: ASTM D 226, Type I; No. 15 asphalt felt.
- B. Sealant and Backer Rod: As specified in Division 7.
- C. Masonry Veneer Anchors at Wood Studs: Adjustable, 2-piece assemblies, for attachment over sheathing to wood studs, allowing vertical and horizontal movement and capable of withstanding a 100-lbf load in tension or compression without deforming.
- D. Flexible Sheet Flashing: Perm-A-Barrier Wall Flashing by W. R. Grace & Company or Keystone Flashing Co. or Polyguard Products Inc. or approved equal, 40 mil thick x 18" wide rolls.

#### **2.05 MORTAR AND GROUT MIXES**

- A. Mortar for Unit Masonry: ASTM C 270, Proportion Specification.
  1. Limit cementitious materials to lime and portland cement.
  2. Masonry below grade and in contact with earth: Type M or S.
  3. Locations indicated on the drawings: Type S.
  4. Applications as follows: Type N.
    - a. Exterior, above-grade veneer.
    - b. Locations for which another mortar type has not been specifically indicated.
- B. Grout fill for masonry: ASTM C476, 28-day compressive strength = 3000 psi

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION PROCEDURES**

- A. Comply with manufacturer's installation instructions for the stone veneer selected with a stacked appearance.
- B. Concrete Masonry Units: Do not wet concrete masonry units prior to laying.
- C. Cutting: Where cutting is required, use power saws to provide clean, sharp, unchipped edges.
  1. Do not use wet cutting techniques with concrete unit masonry.

#### **3.02 LAYING MASONRY UNITS**

- A. Hollow Masonry Units: Install so that face shells are solidly mortared, horizontally and vertically. Bed webs solidly in mortar at starting course.
- B. Joints: Make mortar joints visually and dimensionally consistent.
  1. Except as otherwise indicated, maintain mortar joint widths of 3/8 inch.
- C. Exposed Joints: Using concave jointer slightly larger than joint width, tool exposed joints before mortar has assumed final set.

#### **3.03 JOINT REINFORCEMENT, SINGLE-WYTHE WALLS**

- A. General: Provide continuous horizontal joint reinforcement for specific single-wythe masonry walls indicated. Lap reinforcing a minimum of 6 inches.
- B. Vertical Spacing: Not more than 16 inches on center.

**3.04 CLEANING AND PROTECTION**

- A. Clean masonry after mortar is thoroughly set and cured.
  - 1. Scrape off adhered mortar particles by hand, using non-metallic tools.
  - 2. Comply with directions of concrete unit masonry manufacturer and NCMA Tek Bulletin No. 45 for cleaning CMU.
- B. Protection: Institute protective measures as required to ensure that unit masonry work will be clean and undamaged at substantial completion.

**END OF SECTION 04220**

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## **SECTION 04850 - NATURAL THIN VENEER STONE**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Natural thin veneer stone for exterior vertical surfaces.

#### **1.2 RELATED SECTIONS**

- A. Section 07900 – Joint Sealers (Joint Protection)

#### **1.3 REFERENCES**

- A. ASTM C 144 – Standard Specification for Aggregate for Masonry Mortar.
- B. ASTM C 207 – Standard Specification for Hydrated Lime for Masonry Purposes.
- C. ASTM C 270 – Standard Specification for Mortar for Unit Masonry.
- D. ASTM C 847 – Standard Specification for Metal Lath.

#### **1.4 SUBMITTALS**

- A. Comply with Section 01330 – Submittal Procedures.
- B. Product Data: Submit manufacturer's product data on stone, mortar products, and sealant products, including:
  - 1. Surface preparation and installation instructions.
  - 2. Storage and handling instructions.
- C. Shop Drawings: Submit manufacturer's shop drawings, including plans, elevations, sections, and details, indicating layout, dimensions, anchorages, and jointing methods.
- D. Selection Samples: Submit mortar color samples.
- E. Verification Samples: Submit 2 manufacturer's full-size samples of natural thin veneer stone for each product specified.
- F. Warranty: Submit manufacturer's standard warranty for natural thin veneer stone.

#### **1.5 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Manufacturer regularly engaged, for preceding 10 years, in manufacture of natural thin veneer stone of similar type to that specified.
- B. Mock-Ups: 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 and color are approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.



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

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage:
  - 1. Store materials in accordance with manufacturer's instructions.
  - 2. Store materials in manufacturer's unopened packaging until ready for installation.
  - 3. Store stone materials on pallets on dry, level surface and cover with tarps.
  - 4. Do not stack pallets.
  - 5. Mortar: Store mortar under cover in area where air temperature is maintained between 40 degrees F and 110 degrees F
- C. Handling: Protect materials during handling and installation to prevent damage or contamination.

## **1.7 PROJECT ENVIRONMENTAL REQUIREMENTS**

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install natural thin veneer stone under environmental conditions outside manufacturer's limits.
- B. Hot and Cold Weather Requirements: ACI 530.1/ASCE 6/TMS 602.
- C. Air Temperature: 40 degrees F or above during installation of natural thin veneer stone.
- D. Mortar Mixing Water: Heat mortar mixing water when air temperature falls below 50 degrees F

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURER**

- A. Real Stone Veneers of Tennessee
- B. Tennessee Stone
- C. Culbreth Stone
- D. Approved equal

### **2.2 NATURAL THIN VENEER STONE**

- A. Tennessee Field Stone to match existing color and pattern with thin cut

### **2.3 ACCESSORIES**

- A. Expanded Metal Lath: ASTM C 847; galvanized, self-furring.
- B. Lath Anchorage: Tie wire, nails, screws, and other metal supports; galvanized; type and size to suit application and to rigidly secure materials in place.
- C. Building Paper: ASTM D 226, No. 30 asphalt saturated felt.
- D. Concrete Bonding Agent: Latex type.
- G. Setting Buttons and Shims: Lead or plastic.
- H. Joint Sealants and Joint Fillers: As specified in Section 07900

## **2.4 MORTAR**

- A. Mortar:
  - 1. Cement: ASTM C 270.
  - 2. Lime: ASTM C 207.
  - 3. Sand: ASTM C 144, natural or manufactured.
  - 4. Color Pigments: ASTM C 979, mineral oxide.
  - 5. Water: Potable.
  - 6. Pre-Packaged Latex-Portland Cement Mortar: ANSI A118.4.
- B. Bonding Agent: Acrylic additive.
- C. Mortar Mixes:
  - 1. Grouted Joints:
    - a. Mix Mortar: ASTM C 270, Type S.
    - b. Add color pigments to mortar in accordance with pigment manufacturer's instructions.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Examine surfaces to receive natural thin veneer stone.
- B. Notify Architect of conditions that would adversely affect installation.
- C. Do not begin surface preparation or installation until unacceptable conditions are corrected.
- D. Do not begin installation until backing structure is plumb, bearing surfaces are level, and substrates are clean and properly prepared.
- E. Verify location and secure installation if shelf angles are required.

### **3.2 SURFACE PREPARATION**

- A. Prepare surfaces in accordance with manufacturer's instructions.
- B. Clean surfaces thoroughly before installation.
- C. Prepare surfaces using methods for achieving best results for substrate under project conditions.
- D. Prepare for Installation Over Plywood, Gypsum, or other exterior grade sheathing:
  - 1. Water Resistant Barriers: Cover plywood sheathing with combination of House Wrap (first) and Building Paper with joints lapped shingle style a minimum of 4 inches (102 mm).
  - 2. Metal Lath:
    - a. Install metal lath in accordance with ASTM C 1063.
    - b. Apply metal lath with long dimension perpendicular to supports and with joints lapped a minimum of 1 inch (25 mm).
    - c. Secure laps with tie wire where they occur between supports.
  - 3. Fastening Metal Lath:

- a. Fasten lath to wood supports using galvanized nails at maximum 6 inches on center vertically and 16 inches (406 mm) on center horizontally.
  - b. Fasten with a minimum of 1-inch (25-mm) penetration of wood studs.
  - c. Stop lath 1 inch (25 mm) from finished edges.
- E. Prepare for Installation Over Concrete Masonry Units: Adhere stone directly to concrete masonry units with mortar.
- F. Prepare for Installation of Thin Veneer Stone:
1. Coordination: Coordinate placement of reinforcement, anchors, accessories, flashings, weep holes, and other moisture-control products specified in other sections.
  2. Cleaning: Clean built-in items of loose rust, ice, mud, and other foreign matter before incorporating into wall.
  3. Prime or galvanize ferrous metal built into wall.
  4. Temporary Bracing:
    - a. Provide temporary bracing as required during installation of masonry.
    - b. Maintain bracing in place until building structure provides permanent support.

### **3.3 INSTALLATION**

- A. Install thin veneer stone and mortar in accordance with manufacturer's instructions and ACI 530.1/ASCE 6/TMS 602.
- B. Maintain masonry courses to uniform dimensions. Form vertical and horizontal joints of uniform thickness.
- C. Pattern Bond:
1. Lay out work in advance and distribute color range of stone uniformly over total work area.
  2. Lay stone with face exposed.
  3. Take care to avoid concentration of any 1 color to any 1 wall surface.
  4. Maintain approximate 1/2-inch (13-mm) joint, as stone allows.
  5. Do not use stacked vertical joints.
- D. Placing and Bonding:
1. Dampen substrate as required to reduce excessive suction.
  2. Apply mortar in accordance with PCA Plaster (Stucco) Manual to thickness of 1/2 inch to 3/4 inch (13 mm to 19 mm).
  3. Do not spread more than workable area of 5 to 10 square feet, so mortar will not set before stone is applied.
  4. Lay thin veneer stone in full bed of mortar with full head joints.
  5. Work from bottom up, laying corner pieces first.
  6. Remove excessive mortar as work progresses.
  7. Do not shift or tap veneer stone after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
  8. Isolate top of veneer stone from horizontal structural framing members and slabs or decks with compressible joint filler and sealant as specified in Section 07900 (07 90 00).
- E. Joining Work: Where fresh masonry joins partially set masonry.
1. Remove loose stone and mortar.
  2. Clean and lightly wet surface of set masonry.
  3. To avoid horizontal run of masonry, rack back 1/2 the length of stone in each course.
  4. Tothing is not permitted.
- F. Joints:
1. Lay stone with approximate 1/2-inch (13-mm) mortar joint, as stone allows.
  2. Tool joints when "thumb-print" hard with round jointer, slightly larger than width of joint.

3. Trowel point or concave tool exterior joints below grade.
  4. Flush cut joints to be finished with soft brush only.
  5. Retempering of mortar is not permitted.
  6. Use non-corrosive stone shims as required to maintain uniform joint thickness.
- G. Control and Expansion Joints:
1. Keep joints open and free of debris.
  2. Coordinate control joints as specified in Section 07900 for sealant performance.
- H. Sealant Recesses:
1. Provide open joints 3/4 inch (19 mm) deep and 1/4 inch wide, where masonry meets doors, windows, and other exterior openings.
  2. Coordinate sealant joints as specified in Section 07900 for sealant performance.
- I. Cutting and Fitting:
1. Cut and fit thin veneer stone for chases, pipes, conduit, sleeves, grounds, and other penetrations and adjacent materials.
  2. Coordinate with other work to provide correct size, shape, and location.
- J. During progress of the work, cover top of unfinished stone masonry work for protection from weather.

### **3.4 CLEANING**

- A. Keep face of stone free of mortar as work progresses.
- B. If residual mortar is on face of stone, allow to dry partially and brush mortar off surface and sponge off resid
- C. When work is completed and mortar has set for 2 to 3 days, clean surface from top to bottom using mild ma detergent acceptable to natural thin veneer stone manufacturer.
- D. Do not use harsh cleaning materials or methods that could damage stone.
- E. Do not use metal brushes or acids for cleaning.

### **3.5 PROTECTION**

- A. Protect installed natural thin veneer stone to ensure that, except for normal weathering, stone will be withou or deterioration at time of Substantial Completion.
- B. Touch-up, repair, or replace damaged stone before Substantial Completion.

**END OF SECTION**

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## **SECTION 05510 - METAL STAIRS AND LADDERS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Manual disappearing stairways.

#### **1.2 RELATED SECTIONS**

- A. Section 06 10 00 - Rough Carpentry: Roof framing and opening support.

#### **1.3 REFERENCES**

- A. ANSI A14.9: Safety Requirements for Ceiling Mounted Disappearing Climbing Systems.

#### **1.4 SUBMITTALS**

- A. Submit under provisions of Section 01300.
- B. 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 for Ladders:
  - 1. Plan and section of stair installation.
  - 2. Indicate rough opening dimensions for ceiling and/or roof openings.

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

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store stairway until installation inside under cover. If stored outside, under a tarp or suitable cover.

#### **1.6 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 MANUFACTURERS**

- A. Acceptable Manufacturer:
  - 1. Precision Ladders, LLC
  - 2. The Marwin Company, Inc.
  - 3. Werner Co.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

## **2.2 MANUAL DISAPPEARING STAIRWAY.**

- A. Manual Disappearing Stairway and Components: Stairway, rail, frame and door.
  - 1. Capacity: Unit shall support a 365 lb total load without failure.
  - 2. Performance Standard: Unit shall comply with ANSI A14.9, Commercial Type
  - 3. Ceiling Height: 9'-0" +/-.
- B. Accessories:
  - 1. Steel pole to aid opening and closing stairways.
  - 2. Ceiling hatch, factory sized and mounted to stairway frame.
- C. Components:
  - 1. Ceiling Opening: 22.5 inches by 54 inches.
  - 2. Stairway Stringer: Extruded aluminum channel 5 inches by 1 inch by 1/8 inch. Tri-fold design. Steel blade type hinges. Adjustable feet with plastic Mar-guard. Pitch 63 degrees.
  - 3. Stairway Tread: extruded aluminum channel 5 3/16 inches by 1 1/4 inches by 1/8 inch. Depth is 5 3/16 inches. Deeply serrated top surface. Riser Height: 9-1/2 inches
    - a. Clear Tread Width for Standard Width: 19-1/2 inches (495 mm).
  - 4. Railing: Aluminum bar handrail riveted to stringers, upper section only.
  - 5. Frame: 1/8 inch (3 mm) steel formed channel. 6 inches (152 mm) deep.
  - 6. Aluminum Door: 1/8 inch (3 mm) aluminum panel. Steel piano hinge. Door overlaps bottom flange of frame. Eye bolt accommodates pole for opening and closing door.
  - 7. Hardware:
    - a. Steel blade type hinge connecting stringer sections. Zinc plated and chromate sealed.
    - b. Steel operating arms, both sides. Zinc plated and chromate sealed.
    - c. Double acting steel springs and V-hooks, both sides.
    - d. Rivets rated at 1100 lb (499 kg) shear strength each.
    - e. Steel section alignment clips at stringer section joints.
    - f. Molded rubber guards at corners of aluminum door panel.
  - 8. Finishes: Mill finish on aluminum stairway components. Prime coat on frame.

## **2.3 FABRICATION**

- A. Completely fabricate ladder ready for installation before shipment to the site.
- B. Completely fabricate handrail components ready for field assembly to ladder before shipment to site.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Do not begin installation until rough opening and structural support have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. 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



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## **SECTION 05720 –ALUMINUM BALUSTER**

### **PART 1 – GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Ornamental Welded Aluminum Balusters.

#### **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. NCSBC 2012.

#### **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.

### **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 PICKETS**

- A. Pre-manufactured Railing Systems:
- B. Styles:
  - 1. Vertical pickets
- C. Mounting:
  - 1. Between top and bottom rails
- D. Materials:
  - 1. Pickets: 1 inch square 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 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.

## **2.4 ACCESSORIES**

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

## **2.5 FABRICATION**

- A. Fabricate 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.
  - 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 06076 – PRESERVATIVE TREATMENT (PRESERVATIVE TREATED WOOD)**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Alkaline copper quaternary (ACQ) insect and decay protection treatment for wood products specified in other Division 6 sections, including:
  - 1. Above Ground: Decking, fence boards, handrails.
  - 2. Ground Contact Fresh Water: Fence posts, landscaping, piers, docks.
  - 3. Permanent Wood Foundations: Permanent wood foundations, crawl spaces.
  - 4. Poles: Building, transmission and distribution poles.
  - 5. Decking Use Only: 2X6 decking.
  
- B. Related Sections: Section(s) related to this section include:
  - 1. Division 6 Section: Rough Carpentry.
  - 2. Division 6 Section: Finish Carpentry.
  - 3. Division 6 Section: Manufactured Wood Trusses.

#### **1.02 REFERENCES**

- A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- B. American Wood-Preservers Association (AWPA) Standards:
  - 1. AWPA Standard U1:
    - a. Category UC4B.
  - 2. AWPA Standard T1.
- C. International Conference of Building Officials (ICBO) Evaluation Services:
  - 1. ICBO ES ER-4981.
- D. National Evaluation Service, Inc. (NES):
  - 1. National Evaluation Report (NER): Report No. NER-643.

#### **1.03 SYSTEM DESCRIPTION**

- A. Performance Requirements: Provide ACQ wood preservative treatment which will perform in accordance with manufacturer's stated performance criteria without defects, damage or failure.

#### **1.04 SUBMITTALS**

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit product data for specified products.
- C. Quality Assurance Submittals: Submit the following:
  - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
  - 2. Evaluation Report:
    - a. NER-643.
    - b. ICBO ES ER-4981.

3. Certificates: Certification from treating plant certifying wood treatment applied complies with the criteria and physical requirements for ACQ preservative-treated wood products as specified herein.
- D. Warranty Information

### **1.05 QUALITY ASSURANCE**

- A. Source Quality: Obtain alkaline copper quaternary preservative-treated wood products from a single approved source.
- B. Wood Treatment Plant Qualifications:  
Wood treatment plant experienced in performing work of this section which has specialized in the treatment of wood similar to that required for this project, licensed by the manufacturer.
- C. Regulatory Requirements: Provide preservative treatment that complies with the following regulatory requirements:
  1. NES Report No. NER-643.
  2. ICBO ES ER-4981.
  3. NCSBC (2012) requirements for insect- and decay-preservative-treated wood.
- D. Quality Mark: All copper quaternary preservative-treated wood members shall bear an end tag or permanent ink stamp indicating the following:
  1. Name of wood treating company.
  2. Treatment plant city and state.
  3. Symbol for alkaline copper quaternary (ACQ).
  4. Preservative retention level.
  5. Stamp with AWP UC3B.
  6. Code report number.

### **1.06 DELIVERY, STORAGE & HANDLING**

- A. General: Comply with Division 1 Product Requirement Section.
- B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
  1. Prevent exposure to precipitation during shipping, storage or installation.
  2. Store material off ground and under cover
  3. Allow materials exposed to incidental moisture to dry thoroughly prior to covering with vapor- or moisture-retarding finish material

### **1.07 WARRANTY**

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
  1. Warranty Period: Limited lifetime warranty.

## **PART 2 – PRODUCTS**

### **2.01 ALKALINE COPPER QUATERNARY (ACQ) PRESERVATIVE-TREATED WOOD PRODUCTS**

- A. Material Attributes.

1. Preservative Treatment: Waterborne, alkaline copper quaternary (ACQ) preservative system and water repellency component, containing no arsenic and no chromium.
2. Material Standards: Comply with the following standards: AWPA Standard U1, Category UC3B.
3. Retention Rate for Various Applications:
  - a. Above Ground –decking and handrails: 0.25 – 0.40 pcf

## **2.02 PRODUCT SUBSTITUTIONS**

- A. No Substitutions permitted.

## **2.03 RELATED 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. End Cut Preservative.
- C. Adhesive.

## **PART 3 - EXECUTION**

### **3.01 MANUFACTURER'S INSTRUCTIONS**

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instruction and product carton instructions for installation..

### **3.02 INSTALLATION**

- A. Provide ACQ treated members in accordance with construction documents.
- B. Install ACQ treated wood in accordance with requirements of applicable codes and related Division 6 section. Avoid milling operations that could adversely affect preservative characteristics of copper quaternary preservative-treated wood.
- C. End Cut Treatment: Treat end cuts of ACQ preservative-treated wood members with field-applied end coat prior to installation.
- D. Install using fasteners required by applicable code for use with treated lumber and plywood.

### **3.03 FINISHING**

- A. Prepare ACQ preservative-treated wood for application of finishes in accordance with manufacturer's recommendations.
- B. Apply paint or stain in accordance with Division 9 Section: Painting.

### **3.04 PROTECTION**

- A. Protection:
  1. Protect ACQ preservative-treated wood from damage due to subsequent construction activity.
  2. Protect ACQ preservative-treated wood from moisture prior to application of finishes

## **END OF SECTION 06076**



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## **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, the addition to the existing rest area and the new elevated walkway.
    - b. Miscellaneous lumber for attachment and support of other work.
  - 2. Preservative treatment.

#### **1.02 SUBMITTALS**

- A. Product Data: Submit for: Air infiltration barrier.
- B. Framing Connectors and Supports: Submit manufacturer's standard data demonstrating compliance with building code requirements.

#### **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. Engineer Lumber:
  - 1. LVL beams and headers qualified to ASTM D 5456 by APA- The Engineered Wood Association. 1.9E min., 1 3/4" thick, Fb = min. 2,600 psi. For depth other than 12", Fb shall be multiplied by (12/d)<sup>1/3</sup>. Acceptable products include, but are not limited to:
    - a. Microllam by Weyerhaeuser NR Company.
    - b. GP Lam by Georgia-Pacific, Inc.
    - c. LP Solidstart by Louisiana-Pacific.
- E. 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**

- 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.
  - 1. The following manufacturer's products, or approved equal, provided they comply 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. See Section 06076.
- 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 06130 - HEAVY TIMBER FRAMING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section includes framing using timbers.
- B. Related Requirements:
  - 1. Section 06100 "Rough Carpentry" for dimension lumber items associated with heavy timber framing.

#### **1.3 DEFINITIONS**

- A. Timbers: Lumber of 5 inches nominal or greater in least dimension.
- B. Inspection agencies, and the abbreviations used to reference them, include the following:
  - 1. NLGA: National Lumber Grades Authority.
  - 2. SPIB: Southern Pine Inspection Bureau (The).
  - 3. WCLIB: West Coast Lumber Inspection Bureau.
  - 4. WWPA: Western Wood Products Association.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: For preservative-treated wood products.
  - 1. For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
- B. Shop Drawings: For heavy timber truss framing. Show layout, dimensions of each member, and details of connections.

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. Material Certificates:
  - 1. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.
- B. Certificates of Inspection: Issued by lumber-grading agency for exposed timber not marked with grade stamp.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Schedule delivery of materials to avoid extended on-site storage and to avoid delaying the Work.
- B. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings.

## PART 2 - PRODUCTS

### 2.1 TIMBER

- A. Comply with DOC PS 20 and with grading rules of lumber-grading agencies certified by ALSC's Board of Review as applicable.
  - 1. Factory mark each item of timber with grade stamp of grading agency.
  - 2. For exposed timber indicated to receive a stained or natural finish, apply grade stamps to surfaces that are not exposed to view, or omit grade stamps and provide certificates of grade compliance issued by grading agency.
- B. Timber Species and Grade: Western red cedar; No. 2, WCLIB.
- C. Timber Species and Grade: Southern pine; No. 2, SPIB.
- D. Dressing: Provide dressed timber (S4S) unless otherwise indicated.

### 2.2 PRESERVATIVE TREATMENT

- A. Pressure treat materials with waterborne preservative according to AWPA U1; Use Category UC3b for exterior construction not in contact with the ground.
- B. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  - 1. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not contain colorants, bleed through, or otherwise adversely affect finishes.
- C. Use process that includes water-repellent treatment.
- D. After treatment, re-dry materials to 19 percent maximum moisture content.
- E. Mark treated materials with treatment quality mark of an inspection agency approved by ALSC's Board of Review.
  - 1. For exposed items indicated to receive a stained or natural finish, mark each piece on surface that is not exposed or omit marking and provide certificates of treatment compliance issued by inspection agency.
- F. Application: Treat all heavy timber framing unless otherwise indicated.

### 2.3 TIMBER CONNECTORS

- A. Fabricate side plates and beam hangers from 1/4-inch thick steel plates.
- B. Provide bolts, 5/8 inch unless otherwise indicated, complying with ASTM A 307, Grade A; provide nuts complying with ASTM A 563; and, where indicated, provide flat washers.
- C. Materials: Unless otherwise indicated, fabricate from the following materials:
  - 1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36/A 36M.

- D. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A 123/A 123M or ASTM A 153/A 153M.

## 2.4 MISCELLANEOUS MATERIALS

- A. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.
- B. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

## 2.5 FABRICATION

- A. Shop fabricate members by cutting and restoring exposed surfaces to match specified surfacing. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
- B. Predrill for fasteners and assembly of units.
- C. Where preservative-treated members are indicated, fabricate (cut, drill, surface, and sand) before treatment to greatest extent possible. Where fabrication must be done after treatment, apply a field-treatment preservative to comply with AWPA M4.
  - 1. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
- D. Coat crosscuts with end sealer.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. General: Erect heavy timber framing true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
  - 1. Handle and temporarily support heavy timber framing to prevent surface damage, compression, and other effects that might interfere with indicated finish.
- B. Framing Built into Masonry: Provide 1/2-inch clearance at tops, sides, and ends of members built into masonry.
- C. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.
- D. Fitting: Fit members by cutting and restoring exposed surfaces to match specified surfacing.
  - 1. Predrill for fasteners using timber connectors as templates.
  - 2. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
  - 3. Coat crosscuts with end sealer.
  - 4. Where preservative-treated members must be cut during erection, apply a field-treatment preservative to comply with AWPA M4.

- a. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
- E. Install timber connectors as indicated.
  - 1. Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.

### **3.2 ADJUSTING**

- A. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber framing if repairs are not approved by Architect.

**END OF SECTION 06130**

## **SECTION 06170 – CERTIFIED SHOP FABRICATED STRUCTURAL WOOD**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Manufacture Engineered Wood / Structural Composite Lumber (SCL)
    - a. Glue-Laminated Construction Framing
    - b. Microllam or Laminated Veneer Lumber (LVL).
  - 2. Accessories including but not limited to metal connector plates, structural connectors, fastener, blocking, curbing miscellaneous framing and bracing.

#### **1.02 SUBMITTALS**

- A. Product Data: Submit manufacturer's printed descriptions of materials, components metal connector plates, structural connectors, fasteners, blocking, curbing, miscellaneous framing and bracing, preservative treatment systems, performance criteria, adhesives, finishes, use limitation, recommendations and installation information..
- B. Shop Drawings: Submit fabrication and assembly drawings showing structural members and indication materials, member sizes, design values, material and dimensional relationship of components, assembly configuration, erection sequence, piece numbering, metal plate connectors, extent of fire retardant or preservative treatment, bearing and anchorage details and requirements.
  - 1. Drawings for installed products indicated to comply with design loads shall include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
    - a. Provide truss fabricator's design and engineering data for the required trusses including stress diagrams under the signature, seal and registration number of a qualified structural engineer.
  - 2. Field Measurements: Indicate verified field measurements on the Shop Drawings.
  - 3. Shop Drawings shall not be copies or modified copies of the Contract Drawings.
- C. Samples:
  - 1. Initial for Selection: Submit printed color charts or sample chains indicating manufacturer's complete range for each type of material finish exposed to view that is not yet selected by Architect or specified.
  - 2. Final Selection: Submit a minimum 8 inch (200mm) long full sized sample of each different profile (grain and species for clear finishes) and end bearing condition with proposed finishes, and fasteners.
- D. Quality Assurance Submittals: Test and Evaluation Reports for wood treatments; and Qualification Statements.

#### **1.03 QUALITY ASSURANCE**

- A. Regulatory Requirements:
  - 1. Engineered Wood: APA trademark displayed
    - a. Rim Boards: Per APA EWS Rim Boards and PS 1 or PS 2 or APA Standard PRP-108.
      - i. Glulam Rim Boards shall be resawn grade manufactured per APA EWS Rim Boards and ANSI A190.1.
    - 2. Glulam Standards: Marked with an APA-ES trademark
      - a. Glulam design per:
        - i. APA Glulam Design Specification
        - ii. Form EWS Y117
        - iii. ICC-ES ESR-1940
        - iv. ANSI/AITC Standard A190.1-02
- B. Qualifications:
  - 1. Manufacturer/Fabricator of Shop-Fabricated Structural Wood and Glue-Laminated Construction: A firm experienced a minimum five (5) years in producing products similar to



those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- a. Manufacturer/Fabricator/Supplier shall be capable of providing Third Party Certification that wood materials were legally harvested from sustainably managed forests.
  2. Erector of Shop-Fabricated Structural Wood and Glue-Laminated Construction: Perform installation with skilled, experienced and trained workmen supervised by trained personnel who shall have a minimum three (3) years successful experience in installations of similar size and scope.
    - a. Manufacturer/Fabricator capable of providing field service representation during installation, approving acceptable installer and approving application method.
  3. Testing Agency: An independent testing agency with the experience and capability to conduct the testing indicated, meeting requirements of ISO/IEC Standard 17025 or ASTM E699 and ASTM E329.
  4. Engineer: Licensed by the AHJ where Project site resides.
- C. Certifications:
1. Wood timber and manufactured wood products shall be sourced from sustainably managed forests as certified by SmartWood, SCS, SGS, BVC, SFI, ATFS or CSA and displaying the FSC or PEFC label.
  2. Shop Fabricated Wood Frame Modular Dwelling Units have been erected in compliance with HUD Minimum Property Standards (MPS)

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery, Storage and Handling per TPI, Building Component Safety Information (BCSI), and manufacturer's written recommendations, and DIVISION 01 requirements.

#### **1.5 WARRANTY**

- A. Manufacturer Warranty: Contractor shall provide manufacturer's limited lifetime warranty that Wood I-Beam Joists, Laminated Veneer Lumber, Glue Laminated (Glulam) Beams and engineered Rim Boards are manufactured in complete accordance with industry standards and will, as manufactured, be free from defects in materials and workmanship for the expected life of the structure in which they are installed beginning with Date of Substantial Completion.
- B. Manufacturer Warranty: Contractor shall provide Wood Treatment manufacturer's twenty (20) year limited warranty against structural damage due to termites, carpenter ants and fungal decay.

### **PART 2 – PRODUCTS**

#### **2.01 MANUFACTURERS / FABRICATORS**

- A. Shop-Fabricated Engineered Lumber in VT List:
  1. Allen Lumber, Barre-Montpelier-St. Johnsbury-Waitsfield, VT; [www.allenlumbercompany.com](http://www.allenlumbercompany.com)
  2. LTM, Inc., Essex Junction, VT; 802.879.7578
  3. Vermont Timber Works, N. Springfield, VT; [www.vermonttimberworks.com](http://www.vermonttimberworks.com)
- B. Shop-Fabricated Structural Wood Fabricators in VT List:
  1. Andrew Corp., West Dover, VT; [www.andrewcorpvt.com](http://www.andrewcorpvt.com)
  2. Berry Hill Timber Frames, Cambridgeport, VT; [www.bhtimberframes.com](http://www.bhtimberframes.com)
  3. Green Frame Inc., New Haven, VT; [www.greentimberframe.com](http://www.greentimberframe.com)
  4. Hunger Mountain Timber Frames, Middlesex, VT
- C. Shop-Fabricated Structural FSC Wood Fabricators List:
  1. Laminated Veneer Lumber (LVL)
    - a. Roseburg Forest Products [RigidLam®](#) LVL
    - b. Standard Structures, Inc., Windsor, CA
  2. Rimboard
  3. Laminated Structural Lumber
    - a. Standard Structures, Inc., Windsor, CA
  4. I-Joists

- a. Standard Structures, Inc., Windsor, CA
- 5. Trusses
  - a. Standard Structures, Inc., Windsor, CA (verify FSC)
- 6. Parallam
  - a. Stru cturlam Products Ltd., Penticon, BC, Canada / [Parallam® PSL](#)
- 7. Glulam (AITC [list](#) of FSC manufacturers)
  - a. Alamco Wood Products, LLC, Minnesota
  - b. Boise Cascade, Engineered Wood Products, Emmett, ID; [www.BoiseBuilding.com](http://www.BoiseBuilding.com)
  - c. Boozer Laminated Beam Co., Inc., Alabama
  - d. D. L. Truss, LLC., Pennsylvania
  - e. EnWood Structures, LLC, North Carolina
  - f. Filler King Company, Idaho
  - g. G-L Industries, Inc., Utah
  - h. Laminated Timbers, Inc., Kentucky
  - i. QB Corporation, Idaho
  - k. Rigidply Rafters, Inc., Richland, PA; <http://www.rigidply.com/>
  - l. Sentinel Structures, Inc., Wisconsin
  - m. Structural Wood Systems, Alabama
  - n. Timberweld Manufacturing, Montana
  - o. Unadilla Laminated Products, New York
  - p. Unit Structures, LLC, Arkansas
  - q. Standard Structures, Inc., Windsor, CA
  - r. Structurlam Products Ltd., Penticon, BC, Canada
- D. Product Options
  - 1. Glulam beams
    - a. Layup: Balanced or unbalanced
    - b. Tapered
    - c. Pitched and tapered and curved
    - d. Appearance Classification
    - e. Finish: Stained or painted

## 2.02 DESCRIPTION

- A. Regulatory Requirements
  - 1. CPA [EPP Certified](#) MDF, Particleboard and Hardboard; < 0.20 ppm formaldehyde emissions per ASTM E1333.
  - 2. No Added Urea-Formaldehyde (NAF) MDF, Particleboard and Hardboard
  - 3. Ultra-Low Emitting (ULEF) MDF, Particleboard and Hardboard

## 2.03 MATERIALS

- A. Hardwood or Softwood, as indicated: Provide solid wood lumber and veneers per performance requirements. Do not provide finger-jointed wood unless clearly indicated in the Contract Documents.
- B. Structural and Framing Lumber:
  - 1. S4S surfaced dry lumber per [US DoC PS20](#) and applicable [grading rules](#) per NeLMA or NHLA.
  - 2. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
    - a. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.
- C. Fasteners and Anchorage: Of size type, material and finish suited to application shown.
  - 1. Fasteners: Of appropriate type, length and durability for wood product used to securely fasten to the substrate for the intended life and use of the unit.
  - 2. Metal Connector Plates: Steel type and thickness as indicated.
  - 3. Framing Anchors Manufacturer: Simpson, or an A/E approved equivalent.
- D. Multipurpose Construction Adhesive: Non-HAP formulation complying with ASTM D3498 that is recommended for indicated use by adhesive manufacturer.

- E. Glue: Non-HAP aliphatic-resin, polyurethane, or phenol-resorcinol wood glue recommended by manufacturer for general carpentry use.

## **2.04 MANUFACTURED UNITS**

- A. Engineered Wood Products: Provide products acceptable to AHJ, with allowable design stresses as published by manufacturer that meet or exceed those indicated.
  - 1. Wood Truss Construction Elements - Rafters & Joists: Per Truss Plate Institute (TPI)
  - 2. Structural Glued Laminated Timber: Per APA and ICC-ES
    - a. Laminated-Veneer Lumber: Per ASTM D5456 using exterior-type adhesive per ASTM D2559.
    - b. Parallel-Strand Lumber: Per ASTM D5456 using exterior-type adhesive per ASTM D2559.
    - c. Glulam: Per ANSI / AITC 117 (softwood) or AITC 119 (hardwood).
  - 3. I-Joists: Per ASTM D5055 and APA PRI-400
  - 4. Rim Boards: Per APA PRR-401

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION, PREPARATION, & INSTALLATION**

- A. Examination, preparation and installation per industry standards, fabricator's or manufacturer's written instructions, and DIVISION 01 requirements.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected and installation area properly prepared.
  - 2. Layout installation by marking extents of each item, and anchoring / fastening locations coordinated with blocking or other structural support.
  - 3. Product Preparation: Handle products in accordance with manufacturer's instructions and warranty requirement.
  - 4. WOOD TRUSSES: Per TPI, and fabricator's written instructions.
    - a. Connect wood trusses to wood framing or blocking with framing anchors.
    - b. Provide temporary supports and bracing. Provide permanent cross bracing.
    - c. Suspend conduits, piping & mechanical equipment from framing spanning between top or bottom chord truss panel points with joist hangers at each end. Exercise caution so as not to damage or overload trusses.
    - d. DO NOT CUT OR REMOVE TRUSS MEMBERS.
    - e. Remove metal plate connected wood trusses that are damaged or do not meet requirements and replace with trusses that do meet requirements.
  - 5. ENGINEERED WOOD: Per ANSI / AF&PA [NDS-2005](#), and manufacturer's written instructions.
    - a. Place rough carpentry to indicated levels and lines, with members plumb, aligned, cut and fitted
    - b. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty item and trim.

### **3.02 FIELD QUALITY CONTROL**

- A. Field inspection: Each connection, bracing and bearing condition.

### **3.03 CLEANING, MAINTENANCE AND PROTECTION**

- A. Provide progress cleaning, waste management and provide final cleaning per Division 1 requirements.
- B. Provide Initial maintenance per manufacturer's recommendations.

### **3.04 CLOSEOUT ACTIVITIES**

- A. Substantial completion requirements per Division 1 requirements.

## **END OF SECTION 06100**

## **SECTION 06192 - WOOD TRUSSES**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Provide prefabricated and pre-engineered wood trusses:
  - 1. Gable-shaped trusses. (attic type where noted)
  - 2. Scissors trusses.

#### **1.02 SUBMITTALS**

- A. Submit for approval shop drawings, product data.

#### **1.03 QUALITY ASSURANCE**

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for ten years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Standards: TPI, Design Specification for Metal Plate Connected Wood Trusses; TPI, Design Specification for Metal Plate Connected Parallel Chord Wood Trusses.
- C. Design Engineering: Registered engineer in the State of North Carolina.
- D. Comply with NER 392 (UL sheet).

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Wood Trusses:
  - 1. Lumber Standard: PS 20 American Softwood Lumber Standard.
  - 2. Species: Manufacturer's option.
  - 3. Dressing: Dressed four sides.
  - 4. Moisture Content: Seasoned, 19 percent maximum.
  - 5. Grade for Chord Members: No. 1.
  - 6. Grade for Web Members: No. 3 or Stud Grade.
- B. Connectors, Fasteners, and Metal Framing Anchors:
  - 1. Connectors: Hot-dip galvanized steel sheet, ASTM A 446, Grade A; ASTM A 525, G60.
  - 2. Connectors: Electrolytic zinc-coated steel sheet, ASTM A 446, Grade A; ASTM A 591, Coating Class C.
  - 3. Nails, Wire, Brads, and Staples: FS FF-N-105.
  - 4. Power Driven Fasteners: National Evaluation Report NER-272.
  - 5. Wood Screws: ANSI B18.6.1.
  - 6. Lag Bolts: ANSI B18.2.1.
  - 7. Bolts: ASTM A 307, Grade A; ASTM A 563.
  - 8. Metal Framing Anchors: Hot-dip galvanized steel sheet, ASTM A 446, Grade A; ASTM A

525, G60.

## **PART 3 - EXECUTION**

### **3.01 *INSTALLATION***

- A. Comply with recommendations of TPI Design Specifications for Metal Plate Connected Wood Trusses.
- B. Install materials and systems in accordance with manufacturer's instructions and approved submittals. Install materials and systems in proper relation with adjacent construction. Coordinate with work of other sections.
- C. Restore damaged components. Clean and protect work from damage.

**END OF SECTION**

## **SECTION 06200 - FINISH CARPENTRY**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Wood window trim.
- B. Melamine shelving
- C. Exterior tongue and groove boards
- D. Tongue and groove cedar board for Lobby - see Section 06250.
- E. Cypress siding- see Section 074623

#### **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.
    - 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 and column cover 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. Tongue and groove boards interior.
- C. Exterior trim boards.

#### **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 and column cover from damage and maintain design environmental conditions.

**END OF SECTION 06250**

## **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.

## 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.

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
		ASTM D 2583
Thermal Expansion	$3.02 \times 10^{-5}$ in./in./°C ( $1.80 \times 10^{-5}$ in./in./°F)	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	No fracture—1/2 lb. ball:	NEMA LD 3-2000
Resistance: Sheets	1/4" slab—36" drop 1/2" slab—144" drop	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.

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.

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 06651**

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## **SECTION 07160 - BITUMINOUS DAMPPROOFING**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Substrate preparation.
  - 2. Bituminous dampproofing for new foundation walls.
  - 3. Edge and penetration detailing material.

#### **1.02 SUBMITTALS**

- A. Product Data: Technical product information and installation instructions which demonstrate that products comply with project requirements.

#### **1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver dampproofing materials to project site in factory-sealed containers.
- B. Store materials in dry, well-ventilated space.

#### **1.04 SITE CONDITIONS**

- A. Install dampproofing only when site weather conditions are acceptable per manufacturer's recommendations.
- B. Ventilation: Provide sufficient ventilation during application and curing of dampproofing to prevent buildup of toxic or flammable fumes.

### **PART 2 - PRODUCTS**

#### **2.01 BITUMINOUS DAMPPROOFING MATERIALS**

- A. Cold-Applied Cut-Back Semimastic Asphalt: Solvent-based asphaltic dampproofing mastic of brushing (medium) consistency, fibrated, meeting the requirements of ASTM D 4479, Type I; asbestos free.

#### **2.02 INSTALLATION ACCESSORIES**

- A. Reinforcing Fabric: Woven or nonwoven glass fiber, treated with organic binders and coated for compatibility with dampproofing bitumen.
- B. Detailing Mastic: Asphalt-based plastic roof cement, trowel consistency, meeting the requirements of ASTM D 4586.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that surfaces are smooth, sound, clean, and dry, and that elements which will penetrate dampproofing have been completed and are rigidly installed.

#### **3.02 PREPARATION**

- A. Remove honeycomb, aggregate pockets, fins, ridges, and projecting rough areas.
- B. Fill cracks, holes, depressions, and irregularities with latex patching mortar or detailing mastic as recommended by membrane manufacturer.
- C. Form fillets (cants) at inside corners and around projecting elements using latex patching mortar or detailing mastic.



**3.03 INSTALLATION - GENERAL**

- A. Comply with dampproofing manufacturer's instructions for handling, preparation, application, and protection of dampproofing materials.

**3.04 BELOW-GRADE DAMPPROOFING**

- A. Form flashings at outside corners, changes in plane, and penetrations. Apply coating of dampproofing or detailing mastic, embed layer of fiberglass reinforcing extending at least 12 inches onto dampproofing surface, and topcoat with another layer of dampproofing or detailing mastic.
- B. Apply a uniform coat of semimastic dampproofing using spray applicator, brush, or mop. Coverage, 4-1/2 to 5-1/2 gallons per 100 square feet to provide minimum 30-mil dry film thickness.
- C. Apply a "touch-up" coating over areas where coating is thin or has not formed a smooth lustrous surface.

**3.05 INSPECTION**

- A. Before covering or backfilling dampproofing, notify the Engineer that the dampproofing is ready for inspection.

**3.06 PROTECTION AND CLEANING**

- A. Take measures required to protect completed dampproofing after installation.
- B. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by the manufacturer of the surface.

**END OF SECTION 07160**

## SECTION 07210 - BUILDING INSULATION

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Includes:
  - 1. Extruded polystyrene board.
  - 2. Blanket/Batt Insulation.
  - 3. Spray Foam Sealant

#### 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. Protection, General:
  - 1. Store and protect products in accordance with manufacturers' instructions.
  - 2. Store with seals and labels intact and legible.
  - 3. Store inside and in a dry location.
    - a. Protect insulation materials from moisture and soiling.
    - b. Provide ventilation to prevent condensation and degradation of products.
  - 4. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
- B. 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 ASTM C 665, Type 1 with R-values as noted.
- 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. 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.
- D. Spray Foam Sealant
  - 1. Tack-Free: Dry to the touch with in 20 min.
  - 2. Pressure Build: AAMA 812, less than 0.1 psi.
  - 3. Water Vapor Permeance:
    - a. ASTM E 96 (dry cup): 40 perm.

- b. ASTM E 96 (wet cup): 110 perm.
- 4. Dimensional Stability: ASTM D 2126, maximum 1.0% linear change at -40°F, ambient RH after 2 weeks max 2.0% linear change at 100°F, 97% RH after 2 weeks.
- 5. Durability: ASTM C 719, more than 10 cycles; no cohesive failure or cracking.
- 6. Flame Spread: ASTM E 84, 10.
- 7. Smoke Developed: ASTM E 84, 20.
- 8. Leakage Rate: ASTM E 283, less than 0.01 cfm/ft.2 at 1.57 psf (75 Pa) and 6.24 psf (300 Pa) pressure

## 2.02 ACCESSORIES

- A. Provide accessories as necessary to properly install specified products.
- B. Adhesive: Insulation manufacturer's recommended adhesive, complying with fire performance requirements.
- C. Insulation Fasteners: Impale clip of galvanized steel; type recommended by insulation manufacturer for particular use intended.
- D. Wire Mesh: Galvanized steel, hexagonal wire mesh.
- E. Ventilation Baffles: Formed plastic, metal, or cardboard sized to fit full width of rafter spaces.
- F. Mechanical Insulation Fasteners: FM approved, corrosion resistant, size required to suit application.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Comply with insulation manufacturer's recommendations and installation sequence. Provide permanent placement and support of insulation.
- 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. Foundation installation: Provide installation capable of sustaining subsequent construction work without damage or displacement.
      - 1. Adhesive: Use insulation manufacturer's recommended adhesive to attach insulation boards to foundation. Maximize contact between board surface and substrate.
    - b. Under-slab installation: Do not install insulation before compaction of subgrade is verified. Provide installation capable of sustaining subsequent construction work without damage or displacement.
- D. Insulation Blankets/Batts:
  - 1. Application: Wood-framed construction:
    - a. Unfaced insulation: Friction-fit insulation between framing members.
    - b. Support ceiling insulation with plastic mesh.

**END OF SECTION 07210**

## SECTION 07411-PREFORMED METAL ROOF PANELS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Snap joint-seamed, standing seam metal roof panels, with related metal trim and accessories.

#### 1.02 RELATED REQUIREMENTS

- A. Section 06100 – Rough Carpentry: Roof sheathing.
- B. Section 07210 – Building Insulation
- B. Section 07900 - Joint Sealers: Field-installed sealants.

#### 1.03 REFERENCE STANDARDS

- A. American Architectural Manufacturer's Association (AAMA): [www.aamanet.org](http://www.aamanet.org):
  - 1. [AAMA 621](#) - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
  - 2. [AAMA 809.2](#) - Voluntary Specification Non-Drying Sealants.
- B. American Society of Civil Engineers (ASCE): [www.asce.org/codes-standards](http://www.asce.org/codes-standards):
  - 1. [ASCE 7](#) - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM): [www.astm.org](http://www.astm.org):
  - 1. [ASTM A 653](#) - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 2. [ASTM A 755](#) - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
  - 3. [ASTM A 792/A 792M](#) - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - 4. [ASTM A 980](#) - Standard Specification for Steel, Sheet, Carbon, Ultra High Strength Cold Rolled.
  - 5. [ASTM C 645](#) - Specification for Nonstructural Steel Framing Members.
  - 6. [ASTM C 920](#) - Specification for Elastomeric Joint Sealants.
  - 7. [ASTM D 226](#) - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
  - 8. [ASTM D 2244](#) - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
  - 9. [ASTM D 4214](#) - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
  - 10. [ASTM E 1592](#) - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
  - 11. [ASTM E 1980](#) - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- D. Underwriters Laboratories, Inc. (UL): [www.ul.com](http://www.ul.com):
  - UL 580 - Tests for Uplift Resistance of Roof Assemblies

## **1.04 SUBMITTALS**

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Storage and handling requirements and recommendations.
  - 2. Installation methods.
  - 3. Specimen warranty.
- C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
  - 1. Show work to be field-fabricated or field-assembled.
  - 2. Location and details of post & bar snow retention system.
- D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.
- E. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in NCDOT's name and are registered with manufacturer.

## **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in the manufacture of roofing systems similar to those required for this project, with not less than 5 years of documented experience.
- B. Manufacturer/Source: Provide metal roof panel assembly and accessories from a single manufacturer providing fixed-base roll forming, and accredited under IAS AC 472 Part B.

## **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

## **1.07 WARRANTY**

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of 25 year period from date of Substantial Completion.

# **PART 2 PRODUCTS**

## **2.01 MANUFACTURERS**

- A. Acceptable manufacturers or approved equal are:
  - 1. MBCI Metal Roof and Wall Systems, Basis of Design
  - 2. McElroy Metal
  - 3. ATAS International, Inc.

## **2.02 ARCHITECTURAL ROOF PANELS**

- A. Performance Requirements: Provide complete engineered system complying with specified requirements and capable of remaining weather tight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Metal Roofing: Factory-formed panels with factory-applied finish, mechanically seamed, concealed fastener.

1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Grade 50, Coating Class AZ50, prepainted by the coil-coating process per ASTM A 755/A 755M.
  - a. Nominal Coated Thickness: 24 ga.
  - b. Panel Surface: Smooth with striations in pan
2. Profile: Standing seam, with minimum 1.75 inch seam height; concealed fastener system lapped seam in standing seam profile.
3. Texture: Smooth.
4. Length: Full length of roof slope, without lapped horizontal joints.
5. Width: Maximum panel coverage of 16 inches.

### **2.03 ATTACHMENT SYSTEM**

- A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

### **2.04 PANEL FINISH**

- A. Modified silicone-polyester two-coat system color "**to be determined**" for all metal items;

### **2.05 ACCESSORIES AND MISCELLANEOUS ITEMS**

- A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of closed-cell synthetic rubber, neoprene, or PVC.
- C. Sealants: As specified in Section 07900.
  1. Exposed sealant must cure to rubber-like consistency.
  2. Concealed sealant must be non-hardening type.
  3. Seam sealant must be factory-applied, non-skinning, non-drying type.
- D. Underlayment for Wood Substrate: ASTM D 226 roofing felt, perforated type; covered by water-resistant rosin-sized building paper.
- E. Ice Protection Underlayment: Rubberized asphalt sheet membrane, self-adhering, minimum 40 mils thick, 36-inch-wide rolls; minimum tensile strength 250 psi, in accordance with ASTM D 146.
- F. Snow Guards: Aluminum Post and Bar system with color and finish to match roof. Clamps secured to rib of panel with stainless steel rounded end set screws. Must be approved for use with roof system.

### **2.06 FABRICATION**

- A. Panels: Fabricate and finish panels and accessory items at factory, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
- B. Joints: Factory-install captive gaskets, sealants, or separator strips at panel joints to provide weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Broom clean wood sheathing prior to installation of roofing system.
- B. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.
- C. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.
- D. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.
- E. Panel Support Tolerances to be within tolerances acceptable to metal panel system manufacturer but not greater than the following:
  - 1.  $\frac{1}{4}$ " in 20 foot in any direction
  - 2.  $\frac{3}{8}$ " over any single roof plane.

### **3.02 INSTALLATION**

- A. Overall: Install roofing system in accordance with panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
  - 1. Install roofing system with concealed clips and fasteners.
  - 2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.
- B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.
- C. Rigid insulation board: Install per product manufacturer's most current requirements for installing roof insulation. Stagger joints of layers of insulation board, min. 12 inches.
- C. Self adhering sheet underlayment: Apply in accordance with underlayment manufacturer's installation instructions. Apply over the entire roof surface. Roll laps with roller.
- D. Underlayment: Install roofing felt and building paper slip sheet on roof deck before installing preformed metal roof panels. Secure by methods acceptable to roof panel manufacturer, minimizing use of metal fasteners. Apply from eaves to ridge in shingle fashion, overlapping horizontal joints a minimum of 2 inches (50 mm) and side and end laps a minimum of 3 inches (75 mm). Offset seams in building paper and seams in roofing felt.
- E. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.

### **3.03 CLEANING**

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

### **3.04 PROTECTION**

- A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged roof panels or accessories before date of Substantial Completion.

**END OF SECTION 07411**

## **SECTION 07462 - WOOD SIDING**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Cypress products including the following:
  - 1. Wood siding.
  - 2. Wood boards.

#### **1.2 RELATED SECTIONS**

- A. Section 06 10 00 - Rough Carpentry.

#### **1.3 REFERENCES**

- A. FSC-Certified - Forest Stewardship Council Certification.

#### **1.4 SUBMITTALS**

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- 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 6 inches square representing actual product, color, and patterns.

#### **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Minimum 5 year experience harvesting and milling forest products.
- B. Installer Qualifications: Minimum 2 year experience installing similar products.
- C. Certified Wood: Operations shall be FSC certified.
- D. 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 is approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.

#### **1.6 PRE-INSTALLATION MEETINGS**

- A. Convene minimum two weeks prior to starting work of this section.

#### **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Handling: Handle materials to avoid damage.



## **1.8 PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

## **1.9 SEQUENCING**

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

# **PART 2 PRODUCTS**

## **2.1 MANUFACTURERS**

- A. Acceptable Manufacturer:
  - 1. U.S. Lumber Group LLC
  - 2. Gates Milling, Inc.
  - 3. Williams Lumber Co.
  - 4. Jimmy's Cypress
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600 - Product Requirements.

## **2.2 WOOD SIDING**

- A. Material: Cypress.
- B. Bevel Siding: Select - Smooth Face.
  - 1. 3/4 inch x 8 inches – Rabbetted ends
- C. Channel Siding: Select - Resawn Face.
  - 1. 1 inch x 8 inches.

## **2.3 WOOD BOARDS**

- A. Material: Cypress.
- B. Boards: Solid KD Clear.
  - 1. Grade: A and Better.
  - 2. Finish: S1S2E.
  - 3. 5/4 inches x 4 inches through 5/4 inches x 12 inches

# **PART 3 EXECUTION**

## **3.1 EXAMINATION**

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

## **3.2 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.

### **3.3 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Products shall have all butt and scarf joints caulked with a quality, exterior rated, flexible caulk prior to paint application. All non-trim/fascia abutments shall be caulked and sealed with the same exterior grade caulk.
- C. Ends exposed due to post-manufacturing field cuts shall be sealed with a premium, 100% acrylic primer, to ensure that no fiber is left exposed to the elements.
- D. Use only corrosion resistant fasteners. Acceptable are stainless steel or hot-dipped galvanized nails; minimum size - 7 penny.
- E. Joints shall fall over framing lumber and shall be double nailed. Trim boards of 10 inches (254 mm) or greater in width require 3 nails evenly spaced across the face of the board. Do not nail any less than 1/2 inch (13 mm) from any edge and fasten at a minimum of every 24 inches (610 mm) on center.
- F. Drive nails perpendicular to the framing lumber and the wood trim product; drive nails flush with the product's surface. Nails shall penetrate at least 1-1/4 inches (32 mm) into the structural framing.

### **3.4 PROTECTION**

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

**END OF SECTION**

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## 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 building & storage 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. **Englert LeafGuard\*** or Dixie GutterGuard or Gutter Shutter Co.: 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: "**Lt. Gray**".
  - 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: 3-3/4 inch by 5-1/4 inch minimum size.
  - 2. Downspouts: 3 inch by 4 inch 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.

- F. See SECTION 02712 - SUBDRAINAGE SYSTEMS FOR STRUCTURES for black plastic downspout boots or downspout adapters

## **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:

- 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:

- 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 - STEEL DOORS AND FRAMES**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Standard steel doors and frames.

#### **1.02 REFERENCES**

- A. SDI 100-1991 -- Recommended Specifications: Standard Steel Doors and Frames; Steel Door Institute; 1991.

#### **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.

#### **1.04 QUALITY ASSURANCE**

- A. Quality Standard: Comply with SDI 100.

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

- A. Deliver products in crates or cartons suitable for storage at the site.

### **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. Benchmark Commercial Door Products.
  - 2. Curries Company/Essex Industries, Inc.
  - 3. Steelcraft Manufacturing Company/Masco Industries.

#### **2.02 MATERIALS**

- A. Steel Sheets, Hot-Rolled: ASTM A 569 and ASTM A 568, commercial quality, pickled and oiled.
- B. Steel Sheets, Cold-Rolled: ASTM A 366 and ASTM A 568, commercial quality, matte finish exposed, oiled.
- C. Steel Sheets, Galvanized: ASTM A 591, electrolytic zinc-coated, Class A, mill phosphatized.
- D. Anchorages: Galvanized steel, minimum 18 gage.
- E. Fasteners and Inserts: Units standard with manufacturer.
  - 1. Exterior walls: ASTM A 153, hot-dip galvanized, Class C or D.
- F. Primer Paint: Manufacturer's standard rust-inhibitive coating, suitable to receive finish coatings specified.

#### **2.03 FABRICATION**

- A. Exposed Door Faces: Fabricate from cold-rolled steel.
- B. Frames: Fabricate from cold-rolled or hot-rolled steel.

- C. Seal top and bottom edges integrally with door construction, or use minimum 16 gage steel channels to form flush closure.
- D. Exposed Screws and Bolts: Where required, provide only countersunk, flat Phillips-head fasteners.
- E. Hardware Preparation: Comply with DHI A115 series specifications.
  - 1. Locations: Comply with final shop drawings.
- F. Shop Painting:
  - 1. Primer: Apply primer evenly to achieve full protection of all exposed surfaces.

## **2.04 STEEL DOORS**

- A. General: Fabricate steel doors in accordance with requirements of SDI 100.
- B. Interior Doors:
  - 1. Heavy-Duty, Model 1 - Full Flush.
  - 2. Minimum thickness: 16 gage exterior with insulated cores at exterior.
- C. Exterior doors: Provide exterior doors in accordance with ANSI/SDI A250.8 and in the configuration and size as indicated on the door schedule:
  - 1. Extra heavy-duty 1-3/4 inches, Model 1 - Full flush
  - 2. Minimum thickness: 16 gage exterior with insulated cores at exterior.

## **2.05 STEEL FRAMES**

- A. General: Fabricate steel frames for scheduled openings, in styles and profiles as shown, using concealed fasteners.
  - 1. Minimum thickness: 14 gage exterior.
  - 2. Construction: Mitered and welded corners; foam frames for insulated installation.
- B. Guards: Weld protective covers to back of hardware openings at locations where grout, plaster, or other materials might interfere with hardware operation.

# **PART 3 - EXECUTION**

## **3.01 INSTALLATION**

- A. General: Install steel doors, frames, and accessories to comply with manufacturer's recommendations.
  - 1. Comply with detailed installation requirements of final shop drawings.
- B. Frame Installation: General: Adhere to provisions of SDI 105.
  - 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 in SDI 100.

## **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 08110**

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

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Aluminum-framed storefront door, 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.

## 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: To be determined during submittal.
- 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.

## 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.

## **2.04 FINISHES**

- A. High Performance Organic Finish: AAMA 2604; multiple coats, thermally cured fluoropolymer system; **Color TBD** painted fluorocarbon, 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, ¼" 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.
- 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 08410**

## **SECTION 08552 – VINYL CLAD WOOD WINDOWS**

### **PART 1 GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Vinyl-clad wood casement 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 Manufacturer Association (AAMA):
  - 1. AAMA 1304: Voluntary Specification for Forced-Entry Resistance of Side-Hinged Door Systems.
  - 2. ANSI/AAMA/NWDA 101/I.S.2 /NAFS - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.
- B. ASTM International (ASTM):
  - 1. ASTM E 283 - 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 E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- 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.

Window and Door Manufacturers Association (WDMA): WDMA I.S.4; Water Repellent Preservative Non-Pressure treatment for Millwork.

#### **1.4 PERFORMANCE REQUIREMENTS**

- A. Windows shall be Hallmark certified to a rating of LC – PG50 specifications in accordance with ANSI/WDMA/CSA 101/.S.2/A440-08.
- B. Window Unit Air Leakage, ASTM E 283, 1.57 psf (25 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 7.5 psf (52 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 5 gallons per hour per square foot.

#### **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. Warranty: Submit manufacturer's standard warranty.
- E. Color chart



## **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 [not] 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, Marvin

### **2.2 VINYL-CLAD WOOD AWNING WINDOWS**

- A. Vinyl-Clad Wood Casement Windows: Architect Series factory-assembled clad wood windows
- 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: Fir
  - 3. Exterior Surfaces: Clad with Vinyl.
  - 4. Overall Frame Depth: 5 inches (127 mm).
- C. Sash:
  - 1. Select woods, water 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 sash.
  - 2. Interior Exposed Surfaces: Fir
  - 3. Exterior Surfaces: Clad with aluminum, lap-jointed at corners.
  - 4. Corners: Mortised and tenoned, glued and secured with metal fasteners.
  - 5. Sash Thickness: 1-3/4 inches (45 mm).
- D. 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.

### **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
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: Bronze to match

## **2.5 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.

## **2.6 FINISH**

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

## **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 08551**

## **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

- 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. See also section 08711.
  - 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.
  - 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.

### **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				
1 Continuous Hinge	MCK-12HD 83	BZ	Mc	Pemko or Ives Equivalent
1 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
1 Push/Pull Set	RM252 X 33"	US10B	Ro	Ives or Hager Equivalent
1 Closer	281 PS	US10B	Sa	LCN or Dorma Equivalent
1 Saddle Threshold	425 E X 36"	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 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 Saddle Threshold	425 E X 36"	AL	Na	Pemko or Hager Equivalent
Neoprene gasket				
Drip cap				
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	4066 X 1 1/8"	313	Ad	Schlage or Sargent Equivalent
1 Mortise Cylinder	4036	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	GI	Ives or Rockwood Equivalent
Group #5				
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	GI	Ives or Rockwood Equivalent
1 Wall Bumper	409	US32d	Ro	Ives or Rockwood Equivalent
Group #6				
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	GI	Ives or Rockwood Equivalent
1 Wall Bumper	409	US32d	Ro	Ives or Baldwin Equivalent

**END OF SECTION 08710**

## SECTION 08711 – AUTOMATIC DOOR OPERATORS

### 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 types of automatic door operators:
  - 1. Exterior automatic door operators, low energy, with visible header mounting.
  - 2. Automatic door operators shall be configured for doors as follows:
    - a. Simultaneous pairs, with single operator.
- B. Related Sections:
  - 1. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for entrances furnished and installed separately in Division 8 Section.
  - 2. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
  - 3. Division 16 Sections for electrical connections provided separately including conduit and wiring for power to, and control of, automatic door operators.

#### 1.3 REFERENCES

- A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- B. Underwriters Laboratories (UL):
  - 1. UL 325 – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
  - 2. UL 10C – Positive Pressure Fire Tests of Door Assemblies
- C. American National Standards Institute (ANSI)/Builders' Hardware Manufacturers Association (BHMA):
  - 1. ANSI/BHMA A156.10: Standard for Power Operated Pedestrian Doors.
  - 2. ANSI/BHMA A156.19: Standard for Power Assist and Low Energy Power Operated Doors.
- D. American Society for Testing and Materials (ASTM):
  - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- E. American Association of Automatic Door Manufacturers (AAADM):
- F. National Fire Protection Association (NFPA):
  - 1. NFPA 101 – Life Safety Code.
  - 2. NFPA 70 – National Electric Code.
- G. International Code Council (ICC):
  - 1. IBC: International Building Code
- H. Building Officials and Code Administrators International (BOCA), 1999:
- I. International Standards Organization (ISO):



1. ISO 9001 - Standard for Manufacturing Quality Management Systems
- J. National Association of Architectural Metal Manufacturers (NAAMM):
  1. Metal Finishes Manual for Architectural and Metal Products.
- K. American Architectural Manufacturers Association (AAMA):
  1. **AAMA 606.1 – Integral Color Anodic Finishes for Architectural Aluminum.**
  2. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.

## 1.4 DEFINITIONS

- A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

## 1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide automatic door operators capable of withstanding loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Operating Range: Minus 30 deg F to 130 deg F.
- C. Opening-Force Requirements for Egress Doors: In the event power failure to the operator, swinging automatic entrance doors shall open with a manual force, not to exceed 30 lbf (133 N) applied at 1" (25 mm) from the latch edge of the door.
- D. Break Away Requirements: Automatic door operators shall breakaway with no more than 30 lbf (133 N) applied at 1" (25 mm) from the latch edge of the door.

## 1.6 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 01 submittal procedures.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work. Indicate wiring for electrical supply.
- C. Color Samples for selection of factory-applied color finishes.
- D. Closeout Submittals: Provide the following with project close-out documents.
  1. Owner's Manual.
  2. Warranties.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative, with certificate issued by AAADM, who is trained for installation and maintenance of units required for this Project.
- B. Manufacturer Qualifications: A qualified manufacturer with a manufacturing facility certified under ISO 9001.
- C. Manufacturer shall have in place a national service dispatch center providing 24 hours a day, 7 days a week, emergency call back service.
- D. Certifications: Automatic door operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:
  1. ANSI/BHMA A156.10 and A156.19.
  2. NFPA 101.
  3. UL 325 Listed.
  4. UL 10C Listed.
  5. IBC 2009 and 2012.
  6. BOCA.
- E. Source Limitations: Obtain automatic door operators through one source from a single manufacturer.

- F. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of swinging doors equipped with automatic door operators and are based on the specific system indicated. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- G. Power Operated Door Standard: ANSI/BHMA A156.19.
- H. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- I. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for swinging automatic entrance doors serving as a required means of egress.

## **1.8 PROJECT CONDITIONS**

- A. Field Measurements: General Contractor shall verify openings to receive automatic door operators by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.
- C. Other trades: General Contractor Advise of any inadequate conditions or equipment.

## **1.9 COORDINATION**

- A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to, power supplies, remote activation devices, and electric door latching hardware.
- C. System Integration: Integrate automatic door operators with other systems as required for a complete working installation. Where required for proper operation, provide a time delay relay to signal automatic door operator to activate only after electric lock system is released.

## **1.10 WARRANTY**

- A. Automatic door operators shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.
- B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.
- C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

# **PART 2 PRODUCTS**

## **2.1 AUTOMATIC DOOR OPERATORS**

- A. Approved Manufacturers:
  - 1. Stanley Access Technologies; Magic-Force™ Series automatic door operator.
  - 2. ASSA ABLOY
  - 3. Allegion

## 2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - 1. Headers: 6063-T6.
  - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
  - 3. Sheet and Plate: ASTM B 209.

## 2.3 COMPONENTS

- A. Header Case: Header case shall not exceed 6" (152 mm) square in section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls. The operator shall be sealed against dust, dirt, and corrosion within the header case. Access to the operator and electronic control box shall be provided by a full-length removable cover, edge rabbetted to the header to ensure a flush fit. Removable cover shall be secured to prevent unauthorized access.
- B. Door Arms: A combination of door arms and linkage shall provide positive control of door through entire swing; units shall permit use of butt hung, center pivot, and offset pivot-hung doors.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
- D. Signage: Provide signage in accordance with ANSI/BHMA A156.19.

## 2.4 SWINGING DOOR OPERATORS

- A. General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
- B. Electromechanical Operators: Self-contained unit powered by a minimum 3/16 horsepower, permanent-magnet DC motor; through a high torque reduction gear system.
  - 1. Operation: Power opening and spring closing.
  - 2. Operator Type: Low energy; readily convertible to full energy; no tools required to change type.
  - 3. Handing: Non-handed; no tools required to change handing.
  - 4. Capacity: Rated for door panels weighing up to 350 lb (159 kg).
  - 5. Mounting: Visible
  - 6. Features:
    - a. Adjustable opening and closing speeds.
    - b. Adjustable opening and closing force.
    - c. Adjustable back-check.
    - d. Adjustable hold-open time between 0 and 30 seconds.
    - e. Reverse on obstruction.
    - f. Closed loop speed control with active braking and acceleration.
    - g. Variable obstruction recycle time delay.
    - h. Optional Switch to open/Switch to close operation.
    - i. Optional push to activate operation.
    - j. When operators are provided in pairs, adjustable features are independently adjustable for each operator.
- C. Field Adjustable Spring Closing Operation: The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The closing spring shall be a helical compression spring, adjustable for positive closing action. The spring shall be adjustable, without removing the operator from the header, to accommodate a wide range of field conditions.

- D. Independent Adjustable Closing and Latching Speed Control: The operator shall employ a rheostat module to allow for independent field adjustment of closing and latching speeds using the motor as a dynamic brake.
- E. Field Adjustable Open Stop: The operator shall provide a field adjustable open stop to accommodate opening angles from 80 to 135 degrees without the need for additional components.
- F. Consistent Cycle: The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open. Additionally, the range of the force shall be field adjustable to accommodate a wide range of on-site conditions.
- G. Quiet Performance: The operator shall be designed to output audible noise ratios less than or equal to 50dba.
- H. Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open.
- I. Electrical service to door operators shall be provided under Division 16 Electrical. Minimum service to be 120 VAC, 5 amps.

## 2.5 ELECTRICAL CONTROLS

- A. Electrical Control System: Electrical control system shall include a microprocessor controller and position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position. Systems utilizing external magnets and magnetic switches are not acceptable.
- B. Performance Data: The microprocessor shall collect and store performance data as follows:
  - 1. Counter: A non-resettable counter to track operating cycles.
  - 2. Event Reporting: Unit shall include event and error recording including number of occurrences of events and errors, and cycle count of most recent events and errors.
  - 3. LED Display: Display presenting the current operating state of the controller.
- C. Controller Protection: The microprocessor controller shall incorporate the following features to ensure trouble free operation:
  - 1. Automatic Reset Upon Power Up.
  - 2. Main Fuse Protection.
  - 3. Electronic Surge Protection.
  - 4. Internal Power Supply Protection.
  - 5. Resettable sensor supply fuse protection.
  - 6. Motor Protection, over-current protection.
- D. Soft Start/Stop: A "soft-start" "soft-stop" motor driving circuit shall be provided for smooth normal opening and recycling.
- E. Obstruction Recycle: Provide system to recycle the swinging panels when an obstruction is encountered during the closing cycle.
- F. Programmable Controller: Microprocessor controller shall be programmable and shall be designed for connection to a local configuration tool. Local configuration tool shall be a software driven handheld interface. The following parameters may be adjusted via the configuration tool.
  - 1. Operating speeds and forces as required to meet ANSI/BHMA A156.19.
  - 2. Adjustable and variable features as specified in 2.4, B.
  - 3. Firmware update.
  - 4. Trouble Shooting
    - a. I/O Status.
    - b. Electrical component monitoring including parameter summary.
  - 5. Software for local configuration tool shall be available as a free download from the sliding automatic entrance manufacturer's internet site. Software shall be compatible with the following operating system platforms: Palm®, Android®, and Windows Mobile®.
- G. Emergency Breakout Switch: A cam actuated emergency breakout switch shall be provided to disconnect power to the motor when an in-swinging door is manually pushed in the

- emergency out direction. The operator will then automatically reset and power will be resumed.
- H. Control Switch: Automatic door operators shall be equipped with a three position function switch to control the operation of the door. Control switch shall provide three modes of operation, Automatic, Off, and Hold-Open.
  - I. Power Switch: Automatic door operators shall be equipped with a two position On/Off switch to control power to the door.

## **2.6 ACTIVATION DEVICES**

- A. Push Plates: Provide 4 ½ inch (114 mm) square push plates with UL recognized SPDT switch. Face plates and mounting studs shall be stainless steel. Face plates shall be engraved with the international symbol for accessibility and "Push To Open". Push plates shall be wall mounted in single or double gang electrical boxes and hardwired to door operator controls. Exterior grade.

## **2.7 ALUMINUM FINISHES**

- A. General: Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.
- B. Class I, Color Anodic Finish: AA-M12C22A42/A44 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.70 mils minimum complying with AAMA 611-98, and the following:
  - 1. Color: TO BE DETERMINED.
  - 2. AAMA 606.1
  - 3. Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.

# **PART 3 EXECUTION**

## **3.1 INSPECTION**

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of swinging automatic entrance doors. Proceed with installation only after unsatisfactory conditions have been corrected.

## **3.2 INSTALLATION**

- A. General: Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- B. Mounting: Install automatic door operators/headers plumb and true in alignment with established lines and grades. Anchor securely in place.
  - 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
  - 2. Set headers, arms and linkages level and true to location with anchorage for permanent support.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 16 Sections.

**3.3 FIELD QUALITY CONTROL**

- A. Testing Services: Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

**3.4 ADJUSTING**

- A. Adjust door operators, controls, and hardware for smooth and safe operation, for tight closure, and complying with requirements in ANSI/BHMA A156.19 by AAADM Certified Technician.

**3.5 CLEANING AND PROTECTION**

- A. Clean surfaces promptly after installation. Remove excess sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

**END OF SECTION 08711**

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## **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. Windows; see Section 08551.

#### **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.



1. Exterior glass thickness: 6 mm (1/4 inch nominal), unless otherwise indicated.
  2. Where safety glazing is required by 2012 NCSBC section 2406.4, provide certified safety glazing.
  3. Cut or drill holes in laminated units.
- B. Glass Type I - 1: Sealed insulating units at sidelights 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: 0.52, 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.
  2. UV- and mar-resistant coating: Apply on all surfaces exposed to air.
- A. Transom Grilles: Provide white coated aluminum grilles on all transom lights match grilles on sidelights.

## 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.

## **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. Fixed, extruded-aluminum wall louvers.
- B. See Division 8 Section "Steel Doors and Frames" for louvers in hollow-metal doors.
- C. See Division 15 Sections for louvers that are a part of mechanical equipment.

#### 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, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- 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.

## 2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal High Performance Drainable-Blade Louver
1. Basis-of-Design Product: Architectural Louvers; Model E6DP. Subject to compliance with requirements, provide the specified product or comparable product by one of the following:
    - a. Manufacturers of equivalent products submitted and approved in accordance with Section 01630 - Product Substitution Procedures.
  2. Louver Depth: 6 inches (150 mm)
  3. Blade Profile: Drainable blade with front gutter for water diversion to jambs
  4. Frame and Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm) for blades and frames.
  5. Louver Performance Ratings:
    - a. Free Area: Not less than 9.2 sq. ft. (0.85 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
    - b. Point of Beginning Water Penetration: Not less than 1046 fpm (5.4 m/s).
    - c. Air Performance: Not more than 0.13-inch wg (25-Pa) static pressure drop at 1000 fpm (5.1-m/s) free-area velocity.
  6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

## 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.
1. Insect Screening: Aluminum, 16 x 18 square mesh, 0.011-inch (0.28-mm) wire.
  2. Bird Screening: Flattened, expanded aluminum, 3/4 by 0.050 inch (19 by 1.27 mm) thick.

## 2.5 ALUMINUM FINISHES

- A. High-Performance Organic Finish: 3-coat fluoropolymer 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 manufacturers' 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 08900**

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## **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: wood 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.



## 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. Wood Framing fasteners
  - 1. Wood 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) wood 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) wood 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.

### 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 09252**

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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.

## **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 Wood 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**

## SECTION 09300 - TILE

### PART 1 - GENERAL

#### 1.01 SUMMARY

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

#### 1.03 MAINTENANCE

- A. Extra Materials: Furnish not less than 1 percent of total product installed maintenance stock for each type, color, pattern, and size of tile product installed.

### 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 scheduled on drawings**, as manufactured by **Stone Peak Ceramics, Inc.** approved equals . 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 Weeks Turner Architecture, PA**  
**Attn: Ginger Anderson**  
**3305 Durham Drive, Suite 109**  
**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 products:
    - a. Type 1-Wall at Lavatories
      - i. Manufacturer: Stone Peak
      - ii. Pattern: Plane
      - iii. Size: 60" x 60"
      - iv. Color: Silver Plane, honed finish
    - b. Type 2-Other walls in restroom areasVerse, Cloud, 10"x 30"
      - i. Manufacturer: Ceasar
      - ii. Pattern: Verse
      - iii. Size: 10" x 30"
      - iv. Color: Cloud
    - c. Type 3-Border on all restroom walls
      - i. Manufacturer: Woodland
      - ii. Pattern: Elm Random Brick Glass & Slate medley
      - iii. Size: various on backing
      - iv. Color: WLB102 Precious Gems ELT
    - d. Type 4-Border on all restroom walls
      - i. Manufacturer: Highland Metal
      - ii. Pattern: Mini Pencil and Flat Bar

- iii. Size: .625x12
  - iv. Color: Pewter
  - e. Type 5: Hallway wall stone at entry to restrooms or in front of the Pipe Chases.
    - 1. Manufacturer: Natural Stone.
    - 2. Pattern: Rounded/tumbled.
    - 3. Size: Random on 12" x12" backing.
    - 4. Color: "rio"
  - 2. Trim units: Match color and finish of accent/floor tile (6" high Cove/Sanitary base):
    - a. Shapes and sizes: Manufacturer's standard, as indicated; coordinated with indicated size and coursing of adjoining flat tile, where applicable:
- B. Floor Tile:**
- 1. The design is based on the following products:
    - a. Type 1-Stone Peak, Simply Modern, Coffee, 12"x 24"

### **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.

### **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

### **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.

### **2.05 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.

## **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. Floor 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.
  - 2. 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**



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## **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.

## 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. **Benjamin Moore & Company - Pristine EcoSpec.**
- 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. Devoe & Reynolds Company - Lifemaster.
  - 2. Sherwin Williams Company - Health Spec.
  - 3. 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.

### 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 (color # **TBD**)
- B. **Wood: Doors & frames, windows, horizontal band, 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.

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

- A. **Cypress: Lap siding & trim;**
  - 1. Semi-transparent stain – 2 coats. Color to be selected by architect.
  - 2. Waterproofing Sealer – 2 coats.
- B. Cedar Truss and trim boards
  - 1. Semi-transparent stain – 2 coats. Color to be selected by architect.
  - 2. Waterproofing Sealer – 2 coats.

**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 & A2.10 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.
- D. Felt Seal: ¼" wide continuous felt strip adhered to the sides and bottom face of the Display Case Oak 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.



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) metallic finish.
  - 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 A117.1-2009.

#### 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. Accurate Partitions, color to be determined.
    - b. Sanymetal, color to be determined.
    - c. **Scranton Products.\***: "color to be determined" for all Toilet partitions and for all changing tables or approved equal; **www.scrantonproducts.com**.
  - 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.

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. Accurate Partitions Corp. Lyons, IL 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 hinge, surface-mounted; adjustable to permit door to rest at any angle or closed angle.
  2. Latch for non-handicapped compartments: Surface-mounted type, with emergency access feature.  
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 compartment doors): 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 10235 - FLOOD VENTS**

### **PART 1 - GENERAL**

#### **1.1 SECTION INCLUDES**

- A. Flood vents.

#### **1.2 RELATED SECTIONS**

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 06 10 00 - Rough Carpentry.
- C. Section 07 90 00 - Joint Protection.

#### **1.3 REFERENCES**

- A. ASCE/SEI 24-05, Flood Resistant Design and Construction.
- B. FEMA, 44-CFR, Part 59-60 and 60.3 National Flood Insurance Program (NFIP).
- C. FEMA/FIA-TB 1-2008, Openings in Foundation Walls and Walls of Enclosures for Buildings Located in Special Flood Hazard Areas.
- D. NER-624, National Evaluation Report No. NER-624. July 2007.
- E. International Code Council ICC-ES Acceptance Criteria for Automatic Foundation Flood Vents (AC-364). October 2007
- F. Federal Emergency Management Association's MEMO W-08086, October 2008

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

- A. SMART VENT Products Flood Vents are Engineered Openings comply with the following:
  - 1. Certifications:
    - a. International Code Council - Evaluation Service Report (ESR-2074) including Florida Building Code Supplement.
  - 2. Compliance:
    - a. FEMA Technical Bulletin 1: Openings in Foundation Walls and Walls of Enclosures (TB-1).
    - b. NFIP Bulletin W-08086.
    - c. NFIP Flood Insurance Manual.
    - d. American Society of Civil Engineers: Flood Resistant Design and Construction (ASCE 24-14).
    - e. International Building Codes (IBC)

#### **1.5 SUBMITTALS**

- A. Submit under provisions of Section 013000 - Submittals.
- 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. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

## **1.6 QUALITY ASSURANCE**

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum 5 years documented experience.

B. Installer Qualifications: Installer with experience on projects of a similar size and scope with similar installation conditions.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

A. Deliver and store materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store products in clean, dry area indoors until ready for installation. Store materials in accordance with manufacturer's instructions.

C. Protect materials and finish from damage during handling and installation.

## **1.8 SEQUENCING**

A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

## **1.9 WARRANTY**

A. Provide the manufacturer's limited 15 year warranty.

# **PART 2 PRODUCTS**

## **2.1 MANUFACTURERS**

A. Acceptable Manufacturers:

1. **All model numbers listed are based on the Basis of Design - Smart Vent Products, Inc.; Pitman, NJ; Tel: 877-441-8368; Web: [www.smartvent.com](http://www.smartvent.com) Only equivalent products of the following manufacturers provided they comply with the requirements of the contract documents will be considered acceptable.**

2. USA Flood Air Vents; Saratoga Springs NY; Tel: 800-872-1993; Web: [www.usafloodairevents.com](http://www.usafloodairevents.com)

3. Flood Flaps, LLC; Mt. Pleasant, SC; Tel: 843-881-0190; Web: [www.floodflaps.com](http://www.floodflaps.com)

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

## 2.2 FLOOD VENTS

- A. General: Vents are constructed of Marine Grade 316 Stainless Steel formed and smooth-welded with a rigid construction. Frames are designed for installation in masonry, concrete, or framed walls, stud walls, garage doors and metal panels. Vents have a pivoting door assembly that is fitted with two patented sealed floats that provide vermin protection and immediately and automatically release the door upon contact with rising water to relieve unbalanced lateral forces on foundation walls.
- B. Dual Function Flood Vent Series: Provide both flood protection and natural air ventilation. Louvered blades are temperature controlled with a bimetal coil and the screen is vermin resistant:
1. SMART VENT Products Model # 1540-510: Ventilated with Louvered Blades and Screen.
    - a. Flood Coverage: 200 sq.ft.
    - b. Air Ventilation: 51 sq.in.
    - c. Size: 16 inches W by 8 inches H.
    - d. Rough Opening: 16-1/4 inches W by 8-1/4 inches H.
  2. SMART VENT Products One Piece Multi-Frame Model:
    - a. Amount of vents wide: 1
    - b. Amount of vents high: 2
    - c. Flood Coverage: 400 sq.ft.
    - d. Air Ventilation: 102 sq.in. (Amount of vents multiplied by 51)
- C. Accessories:
1. Stainless Steel straps, four for each vent, and masonry or concrete.
  2. Urethane base adhesive for masonry or concrete surfaces.
  3. Adjustable wrench for thru-bolted models and screwdriver for stud wall models.
  4. Trim and Sleeves: Sleeves for use in 'un-filled' masonry and for, Fire Walls where 'air-space' is required on Exterior Walls and to finish off the inside of openings:
    - a. Adjustable Sleeve/Trim #1540-531-12: 8 inches to 12 inches
    - b. Adjustable Sleeve/Trim #1540-531-15: 12 inches to 15 inches
    - c. Wood Wall Model 1540-570 Interior Trim Flange #1540-573, 4 inch.
- D. Powder-Coat Finish with Color as follows:
1. to be selected by architect
- E. Sealant: Provide joint sealers as specified in Section 07 90 00 - Joint Protection. Only Fire-Rated sealant shall be used on Fire-Rated walls or openings.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify vent locations are ready to receive work, and dimensions are as indicated on shop drawings or as instructed by manufacturers.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D.

**3.2 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Review and coordinate setting drawings, templates, and related items that are to be embedded in concrete and masonry.
- C. Verify that no obstructions exist that will interfere with the proper operation of the vents.
- D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

**3.3 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install vents in at least two different walls spaced evenly around foundation perimeter, and located a maximum of 12 inches above grade to bottom of vent.
- C. Install vents plumb, level, square, true to line, and rigid.
- D. Attach vents securely in place using fasteners supplied or approved by manufacturer.
- E. Separate incompatible materials to prevent galvanic corrosion.
- F. Install one single height flood vent for every existing foundation vent.
- G. Install one multi-frame within new crawlspace access door.
- H. Adjust flood vents for proper operation.

**3.4 PROTECTION**

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

**END OF SECTION**

## 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. **Sign-A-Rama\***; (919) 773-8014, jim@signaram-sraleigh.com
  - 2. Best Manufacturing Co.
  - 3. 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 A117.1-2009, 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.
  - 2. Character Case: Upper case only and solid arrows.



- 3. Surface mount to Beadboard panels.

**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>
	FAMILY ROOM**	1
	KNOCK BEFORE ENTRY	
	WOMEN *	2
	MEN *	2
	Fire extinguisher is located inside Storage room	1
	STORAGE	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 2” from the door frame.

**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**

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

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Fire extinguishers and cabinet located in Storage room.

#### **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.

- 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. Semi-Recessed Sanitary Napkin Disposal:
  1. Basis of design: B-4353 Bobrick.
    - a. Stainless steel.

- b. Single end compartments.
- G. Partition Mounted Sanitary Napkin Disposal:
  - 1. Basis of design: B-4354 Bobrick.
    - 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.
- I&J. Mirrors (and Shelf): 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. Size: 18' x 30" with shelf 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-166 1830 and B-290 2460 manufactured by Bobrick.
- K. 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.
- L. 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.

## 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.
- 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

- 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 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.
- 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.

### 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

**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

- 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.

- 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.

- 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

**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.

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.

- 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

- 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

<u>PIPING</u>	<u>INSULATION TYPE</u>	<u>THICKNESS IN INCHES</u>
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	ELASTOMERIC	1/2
(Provide pre-manufactured, preformed insulation kit on all exposed water supply and waste lines for all lavatories and sinks)		

END OF SECTION 15250

**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



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.

### 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.

- 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

**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

- 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

**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.

## 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

- 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.

**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.

### 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.

- 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

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.

- 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.

### 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.

**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.

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.

### 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

**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.

- 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

**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.

### 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.

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

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.

- 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

## 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.

**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.

- 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

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.

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.

- 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.

- 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

**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

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.

- 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.



- 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.

### 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.

## 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

- 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

3. Normally acceptable readings, velocity and acceleration
4. Unusual conditions at time of test
5. Vibration source (if non-complying)

END OF SECTION 15990

**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
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),



- 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.

**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.

- 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

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

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 01026. 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 01026. 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.

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 State Electrical Inspector from the State Construction Office 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 SCO Inspector, David Souther can be reached at (919) 427-8589.**

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



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.

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.

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

**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

- 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.

- 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

- 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.

- 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



**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.

- 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

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

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

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.

- 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.

- 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.

**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

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.

## 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

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

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

**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".

**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.

- 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.

- 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

**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.

**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. |  |

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

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

### 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.

- B. Adjust aimable fixtures to provide required light intensities.

END OF SECTION 16515





STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

**BUILDING ASBESTOS INSPECTION REPORT**

F.A. # 20-13-01

BUILDING RESTROOM BUILDING

ADDRESS 50 LOCUST STREET

ANDREWS, NC

June 6, 2007

**DATE OF INSPECTION**

This inspection was conducted by an inspector or inspectors  
accredited in the State of North Carolina

TERRY RUSSELL, SR.

printed name

  
signature

Accreditation # 11114



**RESTROOM BUILDING  
FA# 20-13-01**





STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR.  
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

E. NORRIS TOLSON  
SECRETARY

November 9, 1998

**MEMORANDUM**

**TO:** Edward L. Ingle                      Courier No: 06/ 98/ 20  
Facility Coordinator

*Terry F. Russell, Sr.*

**FROM:** Terry F. Russell, Sr.  
Asbestos Program Manager  
Facilities Design

**SUBJECT:** Facility Asbestos Notification Forms For Complex No:20- 13  
Cherokee County , Andrews Rest Stop

Attached are the original signed Asbestos Notification Form(s) for you to review and administer the Form(s) with employees, contractors, or contract employees performing facility related activities at the above noted location. Also, attached is a cover sheet listing all buildings that you are the Facility Coordinator. For the cover sheet to be used as "Acknowledgment of Notification", all buildings listed must be reviewed with employee, contractor, or contract employee.

If you have anyone refusing to sign the 1001S Form or the 1001C Form please have witnessed by two people and so noted on the Form. Make as many copies as necessary to have signed for "Acknowledgment of Notification". Return the fully executed Forms to this office (Courier #51-31-00) and keep a copy for your file. If you need orientation on reviewing and administering the Form please contact me at (919) 715-0400 or the Division Safety Engineer.

It is required that employees watch the "Understanding Asbestos in the Workplace" Video as part of your Safety Program. The video may be scheduled and obtained through DOT Safety and Loss Control at (919) 250-4200.

TFRsr  
Enclosure

cc: Paul Gundlach  
A-File





North Carolina Department of Transportation  
**COMPLEX COVER SHEET**  
**FACILITY ASBESTOS NOTIFICATION**

**Form 1001C**  
 Effective 4-1-97

**Part I. NOTIFICATION**

The North Carolina Department of Transportation is hereby notifying you that the buildings listed below has been tested for the presence of asbestos-containing materials (ACM). A survey report and the 1001S forms for each building listed is to be reviewed with you by the designated Facility Coordinator. This will be on file and may be requested by contacting the NC DOT Asbestos Program Manager at (919) 715-0400.

**Part II. FACILITY INFORMATION** (Please Print Clearly or Type)

1. Facility Name: <b>ANDREWS REST STOP</b>	
2. Facility - F.A.#/County/Unit <b>20-13   CHEROKEE   ROADSIDE ENVIRONMENTAL</b>	
3. Facility Coordinator: <b>EDWARD L. INGLE</b>	Phone No: <b>(828) 890-4685</b>

**Part III. BUILDINGS COVERED BY THIS SHEET:**

Building Name	F.A. #	Building Name	F.A. #
<b>TOILET BUILDING</b>	<b>20-13-01</b>		
<b>STORAGE BLDG.</b>	<b>20-13-02</b>		
<b>PICNIC SHELTER</b>	<b>20-13-03</b>		

**Part IV. ASBESTOS MANAGEMENT CERTIFICATION**

Asbestos Management Planner (Signature) <i>[Signature]</i>	Accreditation Number: <b>30641</b>	Date: <b>11-9-98</b>	Phone Number: <b>919-715-0400</b>
---	---------------------------------------	-------------------------	--------------------------------------

**Part V. ACKNOWLEDGEMENT OF NOTIFICATION**

Name (Please Print Clearly)	Company	Company Phone Number
Signature	Date	

**NOTE:**

DO NOT remove any tags or labels from items labeled as ACM. If you must post any warning labels in association with your work, please remove immediately upon completion of work. If your work requires lock-out/tagout of energy sources, please ensure the facility coordinator for this facility is fully aware of the extent of your activities. Your safety and health while visiting our facilities is our paramount concern.

# ASBESTOS SIGNAGE WORKSHEET

COUNTY CHEROKEE No. (20) COMPLEX ANDREWS REST STOP No. (13) PAGE 1 of 1

FACILITY COORDINATOR EDWARD L. INGLE TELEPHONE# 828-890-4685

ASSET #	BUILDING NAME	FACM SIGNAGE			# OF ENTRANCE SIGNAGE (Facility Coord. & Bldg. ID)	DATE/ACM SIGNAGE INSTALLED
		F	C	T		
20-13-01	TOILET BUILDING				1	
20-13-02	STORAGE BUILDING				1	
20-13-03	PICNIC SHELTER				1 (BLDG. I.D. ONLY)	
TOTALS =					3	(1 BLDG. I.D. ONLY)

\* F= Flooring / C= Ceiling / T= Thermal System Insulation / M= Mechanical / O= Other

DIVISION SAFETY ENGINEER SIGNATURE \_\_\_\_\_  
(To be signed upon completion)

Oct 24, 2016 3:26 pm

County : Cherokee

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
<b>ROADWAY ITEMS</b>						
0001	0063000000-N	SP	GRADING	Lump Sum	L.S.	
0002	2591000000-E	848	4" CONCRETE SIDEWALK	45 SY		
0003	2605000000-N	848	CONCRETE CURB RAMP	1 EA		
0004	5205000000-E	1410	** #8 W/G FEEDER CIRCUIT IN ***** CONDUIT ( ) (2")	300 LF		
0005	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ***** (PC 18)	2 EA		
0006	5270000000-N	SP	GENERIC LIGHTING ITEM (FLAGPOLE LIGHT)	2 EA		
0007	5270000000-N	SP	GENERIC LIGHTING ITEM (NEW - POST TOP LIGHT POLE)	1 EA		
0008	5270000000-N	SP	GENERIC LIGHTING ITEM (RELOCATED - POST TOP LIGHT PO LE)	1 EA		
0009	6000000000-E	1605	TEMPORARY SILT FENCE	200 LF		
0010	6012000000-E	1610	SEDIMENT CONTROL STONE	2 TON		
0011	6036000000-E	1631	MATTING FOR EROSION CONTROL	100 SY		
0012	6042000000-E	1632	1/4" HARDWARE CLOTH	200 LF		
0013	6084000000-E	1660	SEEDING & MULCHING	2 ACR		
0014	6117000000-N	SP	RESPONSE FOR EROSION CONTROL	2 EA		
0015	6900000000-E	SP	TOPSOIL	50 CY		
0016	6970000000-N	SP	GENERIC REST AREA ITEM (FLAGPOLE)	1 EA		
0017	6975000000-N	SP	GENERIC REST AREA ITEM (ELECTRICAL INSTALL REST AREA BUILDING)	Lump Sum	L.S.	

County : Cherokee

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0018	6975000000-N	SP	GENERIC REST AREA ITEM (GENERAL RENOVATION REST AREA BUILDING)	Lump Sum	L.S.	
0019	6975000000-N	SP	GENERIC REST AREA ITEM (MECHANICAL INSTALL REST AREA BUILDING)	Lump Sum	L.S.	
0020	6975000000-N	SP	GENERIC REST AREA ITEM (PLUMBING INSTALL REST AREA BUILDING)	Lump Sum	L.S.	
0021	6980000000-E	SP	GENERIC REST AREA ITEM (SPLIT RAIL FENCE)	500 LF		
1526/Oct24/Q1414.0/D116555000000/E21			<b>Total Amount Of Bid For Entire Project :</b>			



**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
<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				

**\*\* 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.**

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH, NC

**BID BOND**

Contract Number: DN00545 County: Cherokee

KNOW ALL MEN BY THESE PRESENTS, That we, the PRINCIPAL CONTRACTOR (hereafter, PRINCIPAL) and SURETY above named, are held and firmly bound unto the Department of Transportation in the full and just sum of five (5) percent of the total amount bid by the Principal for the project stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

NOW, THEREFORE, the condition of this obligation is: the Principal shall not withdraw its bid within sixty (60) days after the opening of the bids, or within such other time period as may be provided in the proposal, and if the Board of Transportation shall award a contract to the Principal, the Principal shall, within fourteen (14) calendar days after written notice of award is received by him, provide bonds with good and sufficient surety, as required for the faithful performance of the contract and for the protection of all persons supplying labor, material, and equipment for the prosecution of the work. In the event the Principal requests permission to withdraw his bid due to mistake in accordance with the provisions of Article 103-3 of the *Standard Specifications for Roads and Structures*, the conditions and obligations of this Bid Bond shall remain in full force and effect until the Department of Transportation makes a final determination to either allow the bid to be withdrawn or to proceed with award of the contract. In the event a determination is made to award the contract, the Principal shall have fourteen (14) calendar days to comply with the requirements set forth above. In the event the Principal withdraws its bid after bids are opened except as provided in Article 103-3, or after award of the contract has been made fails to execute such additional documents as may be required and to provide the required bonds within the time period specified above, then the amount of the bid bond shall be immediately paid to the Department of Transportation as liquidated damages.

IN TESTIMONY WHEREOF, the Principal and Surety have caused these presents to be duly signed and sealed.

This the \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_

\_\_\_\_\_  
Surety

By \_\_\_\_\_  
General Agent or Attorney-in-Fact Signature

*Seal of Surety*

\_\_\_\_\_  
Print or type Signer's Name

**BID BOND  
CORPORATION**

SIGNATURE OF CONTRACTOR (Principal)

\_\_\_\_\_  
Full name of Corporation

\_\_\_\_\_  
Address as prequalified

By \_\_\_\_\_  
Signature of **President, Vice President, Assistant Vice President**  
*Select appropriate title*

\_\_\_\_\_  
Print or type Signer's name

*Affix Corporate Seal*

Attest \_\_\_\_\_  
Signature of **Secretary, Assistant Secretary**  
*Select appropriate title*

\_\_\_\_\_  
Print or type Signer's name

**BID BOND**

**LIMITED LIABILITY COMPANY**

SIGNATURE OF CONTRACTOR (Principal)

Name of Contractor

\_\_\_\_\_

Full name of Firm

\_\_\_\_\_

Address as prequalified

**Signature of Member/  
Manager/Authorized Agent**

\_\_\_\_\_

Individually

\_\_\_\_\_

Print or type Signer's name

**BID BOND**

**INDIVIDUAL DOING BUSINESS UNDER A FIRM NAME**

SIGNATURE OF CONTRACTOR (Principal)

Name of Contractor \_\_\_\_\_  
Individual Name

Trading and doing business as \_\_\_\_\_  
Full name of Firm

\_\_\_\_\_  
Address as prequalified

Signature of Contractor \_\_\_\_\_  
Individually

\_\_\_\_\_  
Print or type Signer's name

\_\_\_\_\_  
Signature of Witness

\_\_\_\_\_  
Print or type Signer's name

**BID BOND**

**INDIVIDUAL DOING BUSINESS IN HIS OWN NAME**

SIGNATURE OF CONTRACTOR (Principal)

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

**BID BOND**

**PARTNERSHIP**

SIGNATURE OF CONTRACTOR (Principal)

\_\_\_\_\_

Full name of Partnership

\_\_\_\_\_

Address as prequalified

By \_\_\_\_\_

Signature of Partner

\_\_\_\_\_

Print or type Signer's name

\_\_\_\_\_

Signature of Witness

\_\_\_\_\_

Print or type Signer's name



**BID BOND**  
**JOINT VENTURE (2 or 3)**  
SIGNATURE OF CONTRACTORS (Principal)

Instructions to Bidders: **2 Joint Ventures**, Fill in lines (1), (2) and (3) and execute. **3 Joint Venturers** Fill in lines (1), (2), (3), (4) and execute. Line (1), print or type the name of Joint Venture. On line (2), print or type the name of one of the joint venturers and execute below in the appropriate manner required by Article 102-8 of the *Specifications*. On Line (3), print or type the name of second joint venturer and execute below in the appropriate manner required by said article of the *Specifications*. On Line (4), print or type the name of the third joint venturer, if applicable and execute below in the appropriate manner required by said article of the *Specifications*. This form of execution must be strictly followed.

_____ Signature of Witness or Attest	By	_____ Signature of Contractor
_____ Print or type Signer's name		_____ Print or type Signer's name

and

_____ Signature of Witness or Attest	By	_____ Signature of Contractor
_____ Print or type Signer's name		_____ Print or type Signer's name

and

_____ Signature of Witness or Attest	By	_____ Signature of Contractor
_____ Print or type Signer's name		_____ Print or type Signer's name

**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.

**\*AWARD LIMITS ON MULTIPLE PROJECTS\***

It is the desire of the Proposer to be awarded contracts, the value of which will not exceed a total of \$ \_\_\_\_\_, for those projects indicated below on which bids are being opened on the same date as shown in the Proposal Form. Individual projects shall be indicated by placing the project number and county in the appropriate place below. Projects not selected will not be subject to an award limit.

\_\_\_\_\_  
(Project Number)

\_\_\_\_\_  
(County)

\_\_\_\_\_  
(Project Number)

\_\_\_\_\_  
(County)

\_\_\_\_\_  
(Project Number)

\_\_\_\_\_  
(County)

\_\_\_\_\_  
(Project Number)

\_\_\_\_\_  
(County)

\*If a Proposer desires to limit the total amount of work awarded to him in this letting, he shall state such limit in the space provided above in the second line of this form.

It is agreed that in the event that I am (we are) the successful bidder on indicated projects, the total value of which is more than the above stipulated award limits, the Board of Transportation will award me (us) projects from among those indicated which have a total value not exceeding the award limit and which will result in the best advantage to the Department of Transportation.

\_\_\_\_\_  
\*\*Signature of Authorized Person

\*\*Only those persons authorized to sign bids under the provisions of Article 102-8, Item 7, shall be authorized to sign this form.

**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 \_\_\_\_\_  
Secretary/Assistant Secretary  
*Select appropriate title*

By \_\_\_\_\_  
President/Vice President/Assistant Vice President  
*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**

\_\_\_\_\_

Signature of Witness

\_\_\_\_\_

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**

**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

**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**

**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.

DN00545

U-1

Cherokee

**Execution of Contract**

**Contract No: DN00545**

**County: Cherokee**

ACCEPTED BY THE DEPARTMENT

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**Proposals Engineer**

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Date

EXECUTION OF CONTRACT AND BONDS  
APPROVED AS TO FORM:

---

**Division Engineer**

---

Date

Signature Sheet (Bid) - ACCEPTANCE SHEET