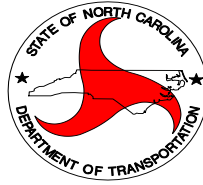


STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION



DIVISION ONE ROADSIDE ENVIRONMENTAL

CONTRACT PROPOSAL

COUNTY: WASHINGTON

CONTRACT NO.: DA00148

TIP NO.: K-5000

WBS ELEMENT: 41532.3.1

DESCRIPTION: WASHINGTON COUNTY REST AREA RENOVATION

DATE: FEBRUARY 20, 2013

BID OPENING: MARCH 20, 2013

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 NC 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.

NAME OF BIDDER

ADDRESS OF BIDDER

RETURN BIDS TO: NC DEPARTMENT OF TRANSPORTATION
Barry Hobbs, PE
Division Project Manager
North Carolina Department of Transportation
113 Airport Drive Suite 100
Edenton, NC 27932

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 shall cause the bid to be considered irregular and shall be grounds for rejection of the bid.

1. The bid form furnished by NCDOT with the proposal shall be used and shall not be altered in any manner. **DO NOT SEPARATE THE BID FORM FROM THE PROPOSAL!**
2. All entries on the bid form, including signatures, shall be written in ink.
3. The Bidder shall submit a unit price for every item on the bid form. The unit prices for the various contract items shall be written in figures. *****Unit prices must be limited to TWO decimal places.*****
4. An amount bid shall be entered on the bid form 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 Bid" 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 shall be determined by adding the amounts bid for each item.
6. Changes in 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 "White Out" or similar product to make corrections.
7. The bid shall be properly executed. All bids shall show the following information:
 - a. Name of individual, firm, corporation, partnership, or joint venture submitting bid.
 - b. Name of individual or representative submitting bid and position or title.
 - c. Name, signature, and position or title of witness.
 - d. Federal Identification Number
 - e. Contractor's License Number
8. Bids submitted by corporations shall bear the seal of the corporation.
9. The bid shall not contain any unauthorized additions, deletions, or conditional bids.
10. 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.
11. **THE PROPOSAL WITH THE BID FORM STILL ATTACHED SHALL BE PLACED IN A SEALED ENVELOPE AND SHALL HAVE BEEN DELIVERED TO AND RECEIVED IN THE NCDOT DIV. ONE OFFICE, 113 AIRPORT DRIVE, SUITE 100, EDENTON, NC 27932 LOCATED APPROXIMATELY 5 MILES SOUTHEAST OF EDENTON, JUST OFF NC 94 ON AIRPORT DRIVE IN THE NORTHEASTERN REGIONAL AIRPORT BUILDING, BY 2:00 P.M. ON WEDNESDAY, MARCH 20, 2013.**
12. The sealed bid must display the following statement on the front of the sealed envelope:
**"QUOTATION FOR CONTRACT NUMBER DA00148 FOR WASHINGTON COUNTY
US-64 REST AREA RENOVATION TO BE OPENED AT 2:00 P.M. ON WEDNESDAY, MARCH
20, 2013."**
13. 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: Barry Hobbs, PE
113 Airport Drive, Suite 100
Edenton, NC 27932**

AWARD OF CONTRACT

The award of the contract, if it be awarded, will be made to the lowest responsible Bidder in accordance with Section 102 (excluding section 102-10) of the 2012 Standard Specifications for Roads and Structures. The lowest responsible Bidder will be notified that his bid has been accepted and that he has been awarded the contract. NCDOT reserves the right to reject all bids.

STANDARD PROVISIONS

GENERAL

All work and materials shall be in accordance with the provisions of the General Guidelines of this contract, the Project Special Provisions, the North Carolina Department of Transportation Standard Specifications for Roads and Structures 2012, the North Carolina Department of Transportation Roadway Standards Drawings, and the current edition of the Manual of Uniform Traffic Control Devices (MUTCD).

The Contractor shall keep himself fully informed of all Federal, State and local laws, ordinances, and regulations, and shall comply with the provisions of Section 107 of the Standard Specifications.

PURCHASE ORDER CONTRACT PREQUALIFICATION

Beginning **July 1, 2009**, any firm that wishes to perform work on Division Purchase Order Contracts as either the prime contractor or as a subcontractor on the project must be prequalified for the type of work they wish to perform. Firms that wish to bid on these projects as the prime contractor must be prequalified prior to submitting a bid. Firms that wish to perform as a subcontractor to the prime contractor must be prequalified prior to beginning work on the project.

For the purposes of prequalification, any firm that is currently prequalified as a prime or a subcontractor on central let projects for the appropriate work codes is considered eligible to work and/or bid on Purchase Order Contracts as long as other items such as bonding and license requirements for the contract are met.

Information regarding the requirements to become prequalified as a Purchase Order Contract contractor, including the application to become prequalified if you are not already prequalified, can be found at the following website:

<http://www.ncdot.org/business/howtogetstarted/>

BIDS

In accordance with GS 136-28.1(b), if the total bid amount of the contract exceeds \$1.2 million, the bid will not be considered for award.

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 Article 108-13(E), of the *North Carolina Department of Transportation Standard Specifications for Roads and Structures*, dated July 1, 2012.

The successful bidder, within fourteen (14) days after notice of award, shall provide the Department with a contract payment bond and a contract performance bond each in an amount equal to 100 percent of the amount of the contract

EXTENSION OF CONTRACT TIME

Failure on the part of the Contractor to furnish bonds or certifications, or to satisfy preliminary requirements necessary to issue the purchase order will not constitute grounds for extension of the contract time. If the Contractor has fulfilled all preliminary requirements for the issuance of a purchase order, and the purchase order authorization is not available by the date of availability, the Contractor shall be granted an extension equal to the number of calendar days the purchase order authorization is delayed after the date of availability.

NOTIFICATION OF OPERATIONS

The Contractor shall notify the Engineer Five (5) working days in advance of beginning work on this project.

BANKRUPTCY

The Department of Transportation, at its option, may terminate the contract upon the filing by the contractor of any petition for protection under the provisions of the Federal Bankruptcy Act.

POSTED WEIGHT LIMITS

The Contractor's attention is directed to the fact that many Primary and Secondary Roads and bridges are posted with weight limits less than the legal limit. The Contractor will not be allowed to exceed the posted weight limits in transporting materials and/or equipment to the projects, unless otherwise approved by the Engineer. The Contractor should make a thorough examination of all projects and haul routes.

INSPECTION

All work shall be subject to inspection by the Engineer at any time. Routinely, the Engineer will make periodic inspections of the completed work. It will be the responsibility of the Contractor to keep the Engineer informed of his proposed work plan and to submit written reports of work accomplished on a frequency to be determined by the Engineer.

EROSION CONTROL

The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent erosion and siltation. Silt fence and erosion control measures shall be installed in accordance with the plans for this project, Division 16 of the 2012 Standard Specifications, and in locations directed by the Engineer or his representative.

UTILITY CONFLICTS

It shall be the responsibility of the Contractor to contact all affected utility owners and determine the precise locations of all utilities prior to beginning construction. Utility owners shall be contacted a minimum of 48 hours prior to the commencement of operations. Special care shall be used in working around or near existing utilities, protecting them when necessary to provide uninterrupted service. In the event that any utility service is interrupted, the Contractor shall notify the utility owner immediately and shall cooperate with the owner, or his representative, in the restoration of service in the shortest time possible. Existing fire hydrants shall be kept accessible to fire departments at all times.

The Contractor shall adhere to all applicable regulations and follow accepted safety procedures when working in the vicinity of utilities in order to ensure the safety of construction personnel and the public.

PLAN, DETAIL AND QUANTITY ADJUSTMENTS

The Department reserves the right to make, at any time during the progress of the work, such alterations in plans or the details of construction as may be found necessary or desirable by the Engineer to complete the project.

COOPERATION BETWEEN CONTRACTORS

In accordance with Section 105-7 of the 2012 Standard Specifications, the Department reserves the right at any time to contract for and perform other or additional work on or near the work covered by the contract.

When separate or additional contracts are let within the limits of any one project, each Contractor shall conduct his work so as not to interfere with or hinder the progress or completion of the work being performed by other Contractors. Contractors working within the limits of the same project shall cooperate with each other.

Each Contractor shall conduct his operations in such a manner as to avoid damaging any work being performed by others or which has been completed by others.

When a project is let under more than one contract and the plans and/or special provisions include a construction schedule, it shall be the responsibility of the Contractors to complete the various phases of the project in accordance with the time limits specified such that the total contracts will be completed by the completion date. This construction schedule will remain in effect until such time as the Contractors at their option submit to the engineer a joint construction schedule meeting the approval of the Engineer. This joint construction schedule shall be signed by authorized representatives of each firm and upon the approval of the Engineer shall be binding on each Contractor and made a part of the contract documents. Subsequent modifications to the joint construction schedule may be made during the course of the work in the same manner.

Failure of the Contractor(s) to complete the various phases of work within the time limits set forth in the construction schedule or latest approved joint construction schedule shall be just cause for removing the Contractor(s) from the Department's list of qualified bidders. A Contractor disqualified from bidding by reason of this provision will not be reinstated until such time as his progress is in accordance with the latest approved construction schedule or until the project is completed and accepted, whichever occurs first. The Department will under no circumstances be liable for any claim for additional compensation due to acts of one Contractor holding up the work of another.

The Department will under no circumstances be liable for any damages experienced by one Contractor as a result of the presence and operations of other Contractors working within the limits of the same project.

APPROVAL OF PERSONNEL

The State shall have the right to approve or reject the project engineer and other supervisory personnel, assigned to a project.

The Engineers or any subcontractor for the Engineers which are employed to provide engineering services for this project shall not engage the services of any person or persons, now in the employment of the State during the time of this Agreement, without written consent of the State.

In the event of engagement, the Engineers or their subcontractors shall restrict such person or persons from working on any of the Engineers' contracted projects in which the person or persons were formerly involved while employed by the State. This restriction period shall be for the duration of the contracted project with which the person or persons was involved. "Involvement" shall be defined as active participation in any of the following activities:

- Drafting the contract;
- Defining the scope of the contract;
- Selection of the Engineers' firm for services;
- Negotiation of the cost of the contract (including calculating man-hours or fees); and
- Administration of the contract.

An exception to these terms may be granted when recommended by the Secretary and approved by the Board of Transportation. Failure to comply with the terms stated above in this section shall be grounds for termination of this contract.

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.

CONTRACTOR CLAIM SUBMITTAL FORM

If the Contractor elects to file a written claim or requests an extension of contract time, it shall be submitted on the *Contractor Claim Submittal Form (CCSF)* available through the Construction Unit or http://ncdot.org/doh/operations/dp_chief_eng/constructionunit/formsmanuals/

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”.

SPECIAL PROVISIONS

SCOPE OF WORK

The construction of the WASHINGTON COUNTY US-64 REST AREA facility consists of the renovation of the existing Rest Area building with additions at the front and rear of the existing building and the replacement of the existing roof structure, interior finishes, plumbing, mechanical, and electrical systems (approximately 2,137 sq. ft.) during the 8 month construction period, and related site work. The above construction work is for the North Carolina Department of Transportation located at the Highway US-64 Rest Area in Plymouth, NC as indicated on the Construction Documents (see Section 01010-Summary of Work).

GENERAL INSTRUCTIONS

It is understood and agreed that by submitting a bid that the Contractor has examined these contract documents, drawings and specifications and has visited the site of the work, and has satisfied himself relative to the work to be performed. The Contractor shall notify the Architect / Engineer of any inconsistencies in the Construction Documents and ask for a clarification before proceeding with the affected work. The Contractor shall assume appropriate responsibility for performing work that he did not report as an inconsistency and correct such work.

MANDATORY PRE-BID CONFERENCE AND PROPOSAL REVIEW

All prospective bidders shall attend a Mandatory Pre-Bid Conference as shown below:

Date: Monday March 4, 2013

Time: 10:00 A.M

Place: NCDOT Division One Office Conference Room (Trailer)

Location: 113 Airport Drive, Edenton, NC 27932

County: Chowan

Telephone: (252) 482-1850

NOTE: The Mandatory Pre-Bid Conference will begin promptly at 10:00 A.M. An official clock for the pre-bid conference will be designated. Contractors who are late will not be permitted to sign in or to participate in the conference.

This conference will be conducted by Department personnel for the purpose of providing additional information about the project and to give bidders an opportunity to ask any questions they may have.

The Engineer will explain areas of responsibility, standards of performance and expected results as well as FHWA reporting requirements. This is also intended to be a time for the Contractor to raise questions.

Any changes made to the contract during the pre-bid conference will be documented and included in an addendum. The addendum must be returned with the bid package, signed and dated. Failure to do so will result in disqualification of bid. Pre-Bid Conference proceedings will be tape recorded.

ELIGIBILITY TO BID

All prospective bidders at the Mandatory Pre-Bid Conference shall meet all of the requirements as shown below:

Only bidders who have attended the entire conference and properly registered at the Mandatory Pre-Bid Conference will be considered eligible to bid on this project. A bid received from a Bidder who has not attended and properly registered at the conference will be rejected as an irregular bid and will not be considered for award.

Attendance at the Mandatory Pre-Bid Conference will not meet the requirements of proper registration unless the individual attending has registered at the conference in accordance with the following:

1. The individual attending the Mandatory Pre-Bid Conference is a full time employee of the company being represented and has **administrative/supervisory** authority over the work to be performed under this contract.
2. The individual signs his/her name and company title on the official roster.
3. The individual writes in the name and address of the company he or she represents.
4. Only one company is shown as being represented by the individual attending.
5. The individual shall sign out when the conference is over.

NOTICE TO BIDDERS

PLANS and SPECIFICATIONS WILL NOT BE DISTRIBUTED IN PAPER FORMAT - Complete plans, specifications and contract documents will be posted in .pdf format at the following web address:

<http://www.ncdot.gov/doh/operations/division1/>

All questions during the Bid Period are to be directed Barry Hobbs, in the form of a written RFI, via e-mail: bhobbs@ncdot.gov.

ALL DOCUMENTATION, DURING THE BID PERIOD, WILL BE POSTED ON THE WEBSITE ONLY. IT IS THE RESPONSIBILITY OF ALL PARTICIPATING IN THE BID TO CHECK THE WEBSITE PRIOR TO BIDDING FOR ADDENDA, LIST OF REGISTERED GENERAL CONTRACTORS, ETC. THE LIST OF GENERAL CONTRACTORS ATTENDING THE MANDATORY PRE-BID WILL BE POSTED ON THE WEBSITE AFTER THE PREBID MEETING.

Digital documents web address will be forwarded the plan rooms of the *Associated General Contractors*, Carolinas Branch, Raleigh (919) 781-3270 (mgilchrist@carolinasagc.org); in the North Carolina office of *McGraw-Hill Dodge Corporation* (704) 599-9461 (dodge_document_ca@mcgraw-hill.com); in the Eastern Regional Office of *Reed Construction Data* in Norcross, GA (800) 424-3996 (docprocessing@reedbusiness.com); in Minority Plan Rooms in: *Raleigh Business & Technology Ctr* (919) 836-8618 (mgreen@raleighBTC.com); and to the *Hispanic Contractors Association of the Carolinas* in the Charlotte, Raleigh, and Winston-Salem Areas (877) 227-1680 (HCAcarolinas@isqst.com).

Proposals shall be made only on the form provided herein with all blank spaces for bids properly filled in and all signatures properly executed.

AWARD OF CONTRACT

(6-28-77) 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”.

CONTRACT TIME AND LIQUIDATED DAMAGES

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

SP1G10

The Contractor shall commence work to be performed under this contract on a date to be specified in written order from the Owner and shall fully complete all work excluding testing hereunder within **240 consecutive calendar days** from the specified **starting date**. For each day in excess of the above number of days, the Contractor shall pay the Owner Two hundred Dollars (**\$200.00**) as **liquidated damages** reasonable estimated in advance to cover the losses to be incurred by the Owner should the Contractor fail to complete this work within the time specified.

If the Contractor is delayed at anytime in the progress of his work by any act or negligence of the Owner, his employees or his separate contractor, by changes ordered in the work; by any causes beyond the Contractor's control or by other causes deemed justifiable by Owner, then the contract time shall be reasonable extended in a written order from the Owner upon written request from the Contractor within ten days following the cause for the delay.

INVOICES FOR PAYMENT

Monthly partial payments will be made after the end of each month based on the Contractor's Application for Payment, retainage is not required, received on the 25th of that month. Final payment will be made within thirty (30) consecutive days after acceptance of the work and the submission both of notarized contractor's affidavit and five copies of invoices which are to include the contract, account and job order numbers.

See Specification Section 01026-Payment and Completion Procedures.

The contractor's affidavit shall state: “This is to certify that all costs of materials, equipment, labor, and all else entering into the accomplishment of this contract, including payrolls, have been paid in full.”

Executed contract documents, insurance certifications and upon completion and acceptance of the work, invoices and other information requested are to be sent to the Roadside Environmental Engineer:

Pat Mansfield, 427 Ocean Hwy North, Hertford, NC 27944 at (252) 426-5041.

It is imperative that contract documents, invoices, etc., be sent only to the above address in order to assure proper and timely delivery and handling.

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).

PERFORMANCE AND PAYMENT BONDS

The Contractor shall furnish a performance bond in the amount of one hundred percent (100%) of the contract amount executed by a surety company authorized to do business in North Carolina, conditioned upon the faithful performance of the contract in accordance with specifications and conditions of the contract. Such bond shall be solely for the protection of the North Carolina Department of Transportation and the State of North Carolina.

The Contractor shall furnish a payment bond in the amount of one hundred percent (100%) of the contract amount executed by a surety company authorized to do business in North Carolina, conditioned upon the prompt payment for all labor or materials for which the Contractor, or his subcontractors, are liable. The payment bond shall be solely for the protection of persons or firms furnishing materials or performing labor for this contract for which the Contractor is liable.

Bonds shall be executed in the form bound with these specifications. All bonds shall be countersigned by an authorized agent of the bonding company who is licensed to do business in North Carolina.

WORKERS COMPENSATION INSURANCE

Pursuant to N.C.G.S. § 97-19, all contractors of the Department of Transportation are required, prior to beginning services, to show 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 stating that it has complied with N.C.G.S. § 97-93 irrespective of whether subcontractors have regularly in service fewer than three employees in the same business within the State of North Carolina, and subcontractors shall be hereinafter liable under the Workers' Compensation Act for payment of compensation and other benefits to its employees for any injury or death due to an accident arising out of and in the course of performance of the work insured by the subcontractor

MATERIALS, EQUIPMENT AND EMPLOYEES

- a. The Contractor shall, unless otherwise specified, supply and pay for all labor, transportation, materials, tools, apparatus, lights, power, heat, sanitary facilities, water, scaffolding, and incidentals necessary for the completion of his work, and shall install, maintain and remove all equipment of the construction, other utensils or things, and be responsible for the safe, proper and lawful construction, maintenance and use of same, and shall construct in the best and most workmanlike manner, a complete job and everything incidental thereto, as shown on the plans, stated in the specifications, or reasonably implied therefrom, all in accordance with the contract documents.
- b. All materials shall be new and of quality specified, except where reclaimed material is authorized herein and approved for use. Workmanship shall at all times be of a grade accepted as the best practice of the particular trade involved, and as stipulated in written standards of recognized organizations or institutes of the respective trades except as exceeded or qualified by the specifications.
- c. No changes shall be made in the work except upon written approval and order of the designer.
- d. Whenever products, materials, or equipment are named in the specifications, the specifications shall be interpreted to mean an item of material or equipment similar to that named and which is suited for the same use and capable of performing the same furnish evidence as to quality of materials.
- e. Each Contractor shall obtain written approval from the Owner/Designer for the use of substitute products, materials or equipment claimed as equal to those specified before the Bid Opening, see the Supplementary General Conditions, page SGC-1.
- f. If at any time during the construction and completion of the work covered by these contract documents, the conduct of any workman of the various crafts be adjudged a nuisance to the Owner of if any workman be considered detrimental to the work, the Contractor shall order such parties removed immediately from grounds.

CONSTRUCTION SUPERVISION

- a. The Contractor shall provide a full-time and competent superintendent who has the authority to act on behalf of the Contractor.
- b. A field office or construction trailer shall be provide by the Contractor with telephone, heating, air conditioning, and secured storage space for the contractors use during the renovation project along with one copy of the drawing plans, specifications, addenda, and change orders.

- c. A set of Record Drawings shall be maintained by the Contractor during construction and turned over to the Architect at the end of the project.

CODES, PERMITS AND INSPECTIONS

- a. The Contractor shall give all notice and comply with all laws, ordinances, codes, rules and regulations bearing on the conduct of the work under this contract. If the Contractor observes that the drawings and specifications are at variance therewith, he shall promptly notify the Owner in writing. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, codes, rules and regulations, and without such notice to the Owner, he shall bear all cost arising therefrom.
- b. All work under this contract shall conform to the North Carolina State Building Code and other state, local and national codes as are applicable. The cost of all required inspection and permits shall be the responsibility of the Contractor.
- c. Projects constructed by the State of North Carolina or any agency or institution of the State are not subject to county or municipal building codes and may not be subject to inspection by county or municipal authorities. The Contractor shall, however, cooperate with the county or municipal authorities by obtaining building permits. Permits shall be obtained at no cost. **Inspection and certification of compliance by the NC Department of Insurance is required on the electrical work on the project.**

SAFETY REQUIREMENTS

- a. The Contractor shall be responsible for the entire site and the building or construction of the same and provide all the necessary protections as required by laws of ordinances governing such conditions and as required by the Owner or Designer. He shall be responsible for any damage to the Owner's property, or that of others on the job, by himself, his personnel or his subcontractors, and shall make good such damages. He shall be responsible for and pay for any claims against the Owner arising from such damages.
- b. The Contractor shall adhere to the rules, regulations and interpretations of the North Carolina Department of Labor relating to Occupational Safety and Health Standards for the Construction Industry (Title 29, Code of Federal Regulations, Part 1926 published in Volume 39, Number 122, Part II, June 24, 1974 Federal Register) and revisions thereto as adopted by General Statutes of North Carolina 95-126 through 155.
- c. The Contractor shall provide all necessary safety measures for the protection of all persons on the work, including the requirements of the A.G.C. Accident Prevention Manual in Construction as amended, and shall fully comply with all state laws and regulations and North Carolina State Building Code requirements to prevent accident or injury to persons on or above the location of the work. He shall clearly mark or post signs warning of hazards existing, and shall barricade excavations, elevator shafts, stairwells and similar hazards. He shall protect against damage or injury resulting from falling materials and he shall maintain all protective devices and signs throughout the progress of the work.

TAXES

- a. Federal Excise Taxes do not apply to materials entering into State work (Internal Revenue Code, Section (3442(3)).
- b. Federal Transportation Taxes do not apply to materials entering into State work (Internal Revenue Code, Section 3475(b) as amended).
- c. North Carolina Sales Taxes and Use Tax do apply to materials entering into State Work (NC Sales and Use Tax Regulation No. 42, Paragraph A), and such costs shall be included in the bid proposal and contract sum.
- b. Local Option Sales and Use Taxes do apply to materials entering into State work as applicable (Local Option Sales and Use Tax Act, Regulation No. 57), and such cost shall be included in the bid proposal and contract sum.

EQUAL OPPORTUNITY

- a. The non-discrimination clause contained in Section 202 (Federal) Executive Order 11246, as amended by Executive Order 11375, relative to Equal Employment Opportunity for all persons without regard to race, color, religion, sex or national origin, and the implementing rules and regulations prescribed by the Secretary of Labor, are incorporated herein.
- b. The Contractors agree not to discriminate against any employees or applicant for employment because of physical or mental handicap in regard to any position for which the employees or applicant is qualified. The Contractor agrees to take affirmative action to employee, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices.

ROOF GUARANTEE

The following paragraph is hereby added and shall become a part of the Guarantee, of the General Conditions of the Contract; the Contractor shall guarantee the materials and workmanship of the roofing against defect due to faulty material, workmanship and negligence by Contractors for a period of twenty-four (24) months following final acceptance of the work, and submit the metal roof panel manufacturer's standard 20 year exterior finish warranty. The substitution of an equal or longer term manufacturer's warranty in lieu of this requirement will not be accepted.

UTILITIES

The General Contractor shall provide approved temporary toilet facilities, located where directed, for complete and adequate sanitary arrangements. These facilities shall be available to other Contractors on the project and shall be kept in a neat and sanitary condition. The General Contractor may use electrical and water from the existing Rest Area building.

MATERIAL SUBSTITUTIONS

Submit proposed product substitutions seven (7) calendar days prior to bid date. An addendum will be issued at least 7 days prior to the bid date, listing all approved substitutions. After the issuance of the substitution addendum no further product substitutions will be made.

PROSECUTION OF WORK

(7-1-95) (Rev. 8-21-12)

108

SP1 G15R

The Contractor will be required to prosecute the work in a continuous and uninterrupted manner from the time he begins the work until completion and final acceptance of the project. The Contractor will not be permitted to suspend his operations except for reasons beyond his control or except where the Engineer has authorized a suspension of the Contractor's operations in writing.

In the event that the Contractor's operations are suspended in violation of the above provisions, the sum of **\$ 500.00** will be charged the Contractor for each and every calendar day that such suspension takes place. The said amount is hereby agreed upon as liquidated damages due to extra engineering and maintenance costs and due to increased public hazard resulting from a suspension of the work. Liquidated damages chargeable due to suspension of the work will be additional to any liquidated damages that may become chargeable due to failure to complete the work on time.

CERTIFICATION FOR FEDERAL-AID CONTRACTS:

(3-21-90)

SP1 G85

The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

- (A) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (B) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, *Disclosure Form to Report Lobbying*, in accordance with its instructions.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by *Section 1352, Title 31, U.S. Code*. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such subrecipients shall certify and disclose accordingly.

U.S. DEPARTMENT OF TRANSPORTATION HOTLINE:

(11-22-94)

108-5

SP1 G100

To report bid rigging activities call: **1-800-424-9071**

The U.S. Department of Transportation (DOT) operates the above toll-free hotline Monday through Friday, 8:00 a.m. to 5:00 p.m. eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the hotline to report such activities.

The hotline is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

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:

- (1) have a contract with a governmental agency; or
- (2) have performed under such a contract within the past year; or
- (3) 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 *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.

CLEANING UP

The contractor shall keep the building and surrounding area reasonably free from rubbish at all times and shall remove debris from the site from time to time or when directed to do so by the Owner. Before final inspection and acceptance of the building, each Contractor shall clean his portion of the work, including glass, hardware fixtures, masonry, tile and marble (using no acid), clean and wax all floors as specified, and completely prepare the building for use by the Owner.

GUARANTEE

The Contractor shall guarantee the materials and workmanship against defect due to faulty materials or faulty workmanship or negligence for a period of twelve (12) months following the final acceptance of the work. Where items of equipment or material carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material. The contractor shall replace such defective materials, equipment, or workmanship without cost to the Owner within the stipulated guarantee period.

PRE-CONSTRUCTION MEETING

A Pre-Construction meeting will be held at a time and place designated by the architect, for the purpose of identifying responsibilities of the owner's, and the architect's personnel and explanation of administrative procedures.

The Contractor shall also use this meeting for the following minimum agenda: Construction schedule, Use of areas of the site, Delivery and storage, Safety, Security, Cleaning up, Submittals, Change orders, Applications for payment, and Record documents.

CLARIFICATIONS OF CONTRACT DOCUMENTS

The Contractor shall request clarifications by the Architect/Engineer, should he find discrepancies or conflicts in the drawings and specification, before proceeding with an item of work well in advance of the scheduled work in question. Drawing plan dimensions shall govern over scaled dimensions. The specifications shall govern over the drawing plans. The Contractor shall not take advantage

of any apparent error or omission in the plans or specifications; the Architect/Engineer will make all interpretations as may be determined necessary for the fulfillment of the intent of the plans and specifications.

TERMINATION OF THE CONTRACT

If the Contractor fails to begin the Work within the time specified, or cannot maintain the progress of the work on schedule, to ensure the completion of the project by the completion date, than the Owner may give notice in writing to the Contractor and his Surety of such delay, neglect or default, and shall declare the Contract in default, 15-days after the written notice. All costs incurred by the Owner required in completing the project shall be deducted from monies due the Contractor and Surety, or if in excess be paid by the Contractor and Surety to the Owner.

CHANGE ORDERS / OVERHEAD & PROFIT

Changes in the Work shall not proceed without an approved Change Order. The Contractor shall provide a complete breakdown of all labor and material costs with the Change Order request. The breakdown shall include the Contractors allowance for overhead and profit not to exceed 20% of the net cost of the change with work provided directly by the Prime Contractor or the allowance shall not exceed 15% for subcontractor with 10% for the Prime Contractor. Actual costs for bonds, insurance, and sales taxes related to the costs of this Work may be incorporated into the breakdown.

FIELD ORDERS

A Field Order maybe issued by the Architect/Engineer to expedite critical changes in the Work with a not to exceed lump sum cost. The Contractor's breakdown/price quotation can be faxed to the Architect/Engineer for review and issuance of the Field Order. The Field Order shall be prepared by the Architect/Engineer faxed to the Contractor and Owning Agency for signature approval before the change in Work can proceed. A formal Change Order shall follow.

MATERIALS

(2-21-12) (Rev. 12-18-12)

1000, 1005, 1080, 1081, 1092

SP10 R01

Revise the 2012 Standard Specifications as follows:

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

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

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 Aggre- gate	Rounded Aggregate	Angular Aggre- gate			Min.	Max.	Min.	Max.
<i>Units</i>	<i>psi</i>					<i>inch</i>	<i>inch</i>	<i>lb/cy</i>	<i>lb/cy</i>	<i>lb/cy</i>	<i>lb/cy</i>
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	2.5	4	508	-	545	-
B Slip Formed	2,500	0.488	0.567	-	-	1.5	-	508	-	-	-
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	-	Flow- able	-	-	40	100
Flowable Fill non-excavatable	125	as needed	as needed	as needed	as needed	-	Flow- able	-	-	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 10-23, Table 1005-1, AGGREGATE GRADATION-COARSE AGGREGATE, replace with the following:

AGGREGATE GRADATION - COARSE AGGREGATE													
Percentage of Total by Weight Passing													
Std. Size #	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#40	#200	Remarks
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, Str. Concrete, Shoulder Drain, 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	AST, Str. Concrete, Asphalt Plant Mix
78M	-	-	-	100	98-100	75-100	20-45	0-15	-	-	-	A	Asphalt Plant Mix, AST, Str. Conc, Weep Hole
14M	-	-	-	-	-	35-70	5-20	-	-	0-8	-	A	Asphalt Plant Mix, AST, Weep Hole Drains, Str. Concrete
9	-	-	-	-	-	85-100	10-40	-	-	0-10	-	A	AST
ABC	-	100	75-97	-	55-80	35-55	-	25-45	-	14-30	4-12 ^B	A	Aggregate Base Course, Aggregate Stabilization
ABC (M)	-	100	75-100	-	45-79	20-40	-	0-25	-	-	0-12 ^B	A	Maintenance Stabilization
Light-weight ^C	-	-	-	-	100	80-100	5-40	0-20	-	0-10	0-2.5	A	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 10-126, Table 1078-1, REQUIREMENTS FOR CONCRETE, replace with the following:

TABLE 1078-1 REQUIREMENTS FOR CONCRETE		
Property	28 Day Design Compressive Strength 6,000 psi or less	28 Day Design Compressive Strength greater than 6,000 psi
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 10-162, Subarticle 1081-1(A) Classifications, lines 4-7, delete the second and third sentences of the description for Type 3A.

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

Page 10-204, Subarticle 1092-2(A) Performance and Test Requirements, replace **Table 1092-3 Minimum Coefficient of Retroreflection for NC Grade A** with the following:

Observation Angle, degrees	Entrance Angle, degrees	White	Yellow	Green	Red	Blue	Fluorescent Yellow Green	Fluorescent Yellow
0.2	-4.0	525	395	52	95	30	420	315
0.2	30.0	215	162	22	43	10	170	130
0.5	-4.0	310	230	31	56	18	245	185
0.5	30.0	135	100	14	27	6	110	81
1.0	-4.0	120	60	8	16	3.6	64	48
1.0	30.0	45	34	4.5	9	2	36	27

PLANT AND PEST QUARANTINES

(Imported Fire Ant, Gypsy Moth, Witchweed, And Other Noxious Weeds)
(3-18-03)

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, 919-733-6932, or <http://www.ncagr.com/plantind/> 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 or other noxious weeds.

ERRATA

(1-17-12) (Rev. 9-18-12)

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 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 10

Page 10-74, Table 1056-1 Geotextile Requirements, replace “50%” for the UV Stability (Retained Strength) of Type 5 geotextiles with “70%”.

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 15-6, 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”.

MINORITY AND FEMALE EMPLOYMENT REQUIREMENTS

Z-7

NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (*EXECUTIVE NUMBER 11246*)

1. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, see as shown on the attached sheet entitled "Employment Goals for Minority and Female participation".

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The Contractor's compliance with the Executive Order and the regulations in *41 CFR Part 60-4* shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in *41 CFR 60-4.3(a)*, and its effort to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project or the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the executive Order and the regulations in *41 CFR Part 60-4*. Compliance with the goals will be measured against the total work hours performed.

2. As used in this Notice and in the contract resulting from this solicitation, the "covered area" is the county or counties shown on the cover sheet of the proposal form and contract.

EMPLOYMENT GOALS FOR MINORITY AND FEMALE PARTICIPATION

Economic Areas

Area 023 29.7%

Bertie County
Camden County
Chowan County
Gates County
Hertford County
Pasquotank County
Perquimans County

Area 024 31.7%

Beaufort County
Carteret County
Craven County
Dare County
Edgecombe County
Green County
Halifax County
Hyde County
Jones County
Lenoir County
Martin County
Nash County
Northampton County
Pamlico County
Pitt County
Tyrrell County
Washington County
Wayne County
Wilson County

Area 025 23.5%

Columbus County

Area 026 33.5%

Bladen County
Hoke County
Richmond County
Robeson County
Sampson County
Scotland County

Area 027 24.7%

Chatham County
Franklin County
Granville County
Harnett County
Johnston County
Lee County
Person County
Vance County
Warren County

Area 028 15.5%

Alleghany County
Ashe County
Caswell County
Davie County
Montgomery County
Moore County
Rockingham County
Surry County
Watauga County
Wilkes County

Area 029 15.7%

Alexander County
Anson County
Burke County
Cabarrus County
Caldwell County
Catawba County
Cleveland County
Iredell County
Lincoln County
Polk County
Rowan County
Rutherford County
Stanly County

Area 0480 8.5%

Buncombe County
Madison County

Area 030 6.3%

Avery County
Cherokee County
Clay County
Graham County
Haywood County
Henderson County
Jackson County
McDowell County
Macon County
Mitchell County
Swain County
Transylvania County

Duplin County
Onslow County
Pender County

SMSA Areas

Area 5720 26.6%

Currituck County

Area 9200 20.7%

Brunswick County
New Hanover County

Area 2560 24.2%

Cumberland County

Area 6640 22.8%

Durham County
Orange County
Wake County

Area 1300 16.2%

Alamance County

Yancey County

Area 3120 16.4%

Davidson County
Forsyth County
Guilford County
Randolph County
Stokes County
Yadkin County

Area 1520 18.3%

Gaston County
Mecklenburg County
Union County

Goals for Female Participation in Each Trade (Statewide) 6.9%

DISADVANTAGED BUSINESS ENTERPRISE (DIVISIONS)

(10-16-07)(Rev. 1-17-12)

102-15(J)

SP1 G62

Description

The purpose of this Special Provision is to carry out the U.S. Department of Transportation's policy of ensuring nondiscrimination in the award and administration of contracts financed in whole or in part with Federal funds. This provision is guided by 49 CFR Part 26.

Definitions

Additional DBE Subcontractors - Any DBE submitted at the time of bid that will not be used to meet the DBE goal. No submittal of a Letter of Intent is required.

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

Contract Goal Requirement - The approved DBE participation at time of award, but not greater than the advertised contract goal.

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

Disadvantaged Business Enterprise (DBE) - A firm certified as a Disadvantaged Business Enterprise through the North Carolina Unified Certification Program.

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

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 DBE certification, such that an applicant is required to apply only once for a DBE certification that will be honored by all recipients of USDOT funds in the state and not limited to the Department of Transportation only. The Certification Program is 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.

Forms and Websites Referenced in this Provision

DBE Payment Tracking System - On-line system in which the Contractor enters the payments made to DBE 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 DBE 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 DBE Replacement Request Form - Form for replacing a committed DBE.
<https://apps.dot.state.nc.us/includes/download/external.html?pdf=http%3A//www.ncdot.gov/doh/forms/files/RF-1.pdf>

SAF Subcontract Approval Form - Form required for approval to sublet the contract.
http://www.ncdot.org/doh/operations/dp_chief_eng/constructionunit/saf.xls

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.

<https://apps.dot.state.nc.us/includes/download/external.html?pdf=http%3A//www.ncdot.gov/doh/forms/files/JC-1.pdf>

Letter of Intent - Form signed by the Contractor and the DBE subcontractor, manufacturer or regular dealer that affirms that a portion of said contract is going to be performed by the signed DBE for the amount listed at the time of bid.

<http://www.ncdot.org/doh/preconstruct/ps/contracts/letterofintent.pdf>

Listing of DBE Subcontractors Form - Form for entering DBE subcontractors on a project that will meet this DBE goal. This form is for paper bids only.

<http://www.ncdot.gov/doh/preconstruct/ps/word/MISC2.doc>

Subcontractor Quote Comparison Sheet - Spreadsheet for showing all subcontractor quotes in the work areas where DBEs quoted on the project. This sheet is submitted with good faith effort packages.

http://www.ncdot.gov/business/ocs/goodfaith/excel/Ex_Subcontractor_Quote_Comparison.xls

DBE Goal

The following DBE goal for participation by Disadvantaged Business Enterprises is established for this contract:

Disadvantaged Business Enterprises **3.0 %**

- (A) *If the DBE goal is more than zero*, the Contractor shall exercise all necessary and reasonable steps to ensure that DBEs participate in at least the percent of the contract as set forth above as the DBE goal.
- (B) *If the DBE goal is zero*, the Contractor shall make an effort to recruit and use DBEs during the performance of the contract. Any DBE 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 DBE certified shall be used to meet the DBE goal. 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 DBE Subcontractors

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

Blank forms will not be deemed to represent zero participation. Bids submitted that do not have DBE 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.

- (A) *If the DBE goal is more than zero*,
 - (1) Bidders, at the time the bid proposal is submitted, shall submit a listing of DBE participation, including the names and addresses on *Listing of DBE 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 DBE participation for the contract.
 - (2) If bidders have no DBE participation, they shall indicate this on the *Listing of DBE Subcontractors* by entering the word "None" or the number "0." This form shall be completed in its entirety.

- (3) The bidder shall be responsible for ensuring that the DBE 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 DBE's participation will not count towards achieving the DBE goal.

- (B) *If the DBE goal is zero*, bidders, at the time the bid proposal is submitted, shall enter the word "None"; or the number "0"; or if there is participation, add the value on the *Listing of DBE Subcontractors* contained elsewhere in the contract documents.

DBE Prime Contractor

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

For example, if the DBE goal is 45% and the DBE bidder will only perform 40% of the contract work, the prime will list itself at 40%, and the additional 5% shall be obtained through additional DBE participation with DBE subcontractors or documented through a good faith effort.

DBE prime contractors shall also follow Sections A or B listed under *Listing of DBE Subcontractor* just as a non-DBE bidder would.

Written Documentation – Letter of Intent

The bidder shall submit written documentation for each DBE that will be used to meet the DBE goal of the contract, indicating the bidder's commitment to use the DBE 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 DBE to be used toward the DBE goal, or if the form is incomplete (i.e. both signatures are not present), the DBE participation will not count toward meeting the DBE goal. If the lack of this participation drops the commitment below the DBE goal, the Contractor shall submit evidence of good faith efforts, completed in its entirety, to the Engineer no later than 12:00 noon on 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 the DBE goal the apparent lowest responsive bidder shall submit to the Department documentation of adequate good faith efforts made to reach the DBE goal.

One complete set 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 DBE 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 DBE 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 DBE participation. Adequate good faith efforts also mean that the bidder actively and aggressively sought DBE 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 goal 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 and/or written notices through the use of the NCDOT Directory of Transportation Firms) the interest of all certified DBEs who have the capability to perform the work of the contract. The bidder must solicit this interest within at least 10 days prior to bid opening to allow the DBEs to respond to the solicitation. Solicitation shall provide the opportunity to DBEs within the Division and surrounding Divisions where the project is located. The bidder must determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.
- (B) Selecting portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the prime contractor might otherwise prefer to perform these work items with its own forces.
- (C) Providing interested DBEs 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 DBEs. It is the bidder's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBEs 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 DBEs to perform the work.
 - (2) A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE 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 DBEs is not in itself sufficient reason for a bidder's failure to meet the contract DBE goal, 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 DBEs if the price difference is excessive or unreasonable.
- (E) Not rejecting DBEs 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 DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or bidder.
- (G) Making efforts to assist interested DBEs 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 DBEs. Contact within 7 days from the bid opening the Business Development Manager in the Business Opportunity and Work Force Development Unit to give notification of the bidder's inability to get DBE quotes.
- (I) Any other evidence that the bidder submits which shows that the bidder has made reasonable good faith efforts to meet the DBE 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 DBE goal.
- (2) The bidders' past performance in meeting the DBE goals.
- (3) The performance of other bidders in meeting the DBE goal. For example, when the apparent successful bidder fails to meet the DBE goal, but others meet it, you may reasonably raise the question of whether, with additional

reasonable efforts the apparent successful bidder could have met the goal. If the apparent successful bidder fails to meet the DBE goal, but meets or exceeds the average DBE 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 DBE goal can be met or that an adequate good faith effort has been made to meet the DBE goal.

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 DBE Participation Toward Meeting DBE Goal

(A) Participation

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

(B) Joint Checks

Prior notification of joint check use shall be required when counting DBE 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 DBE may enter into subcontracts. Work that a DBE subcontracts to another DBE firm may be counted toward the contract goal requirement. Work that a DBE subcontracts to a non-DBE firm does not count toward the contract goal requirement. If a DBE 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 DBE is not performing a commercially useful function. The DBE may present evidence to rebut this presumption to the Department. The Department's decision on the rebuttal of this presumption is subject to review by the Federal Highway Administration but is not administratively appealable to USDOT.

(D) Joint Venture

When a DBE 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 DBE in the joint venture, that portion of the total dollar value being a distinct clearly defined portion of work that the DBE performs with its forces.

(E) Suppliers

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

(F) Manufacturers and Regular Dealers

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

- (1) The fees or commissions charged by a DBE 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 DBE, 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) DBE Utilization

The Contractor may count toward its contract goal requirement only expenditures to DBEs that perform a commercially useful function in the work of a contract. A DBE 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 DBE 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 DBE 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 DBE credit claimed for its performance of the work, and any other relevant factors.

(B) DBE Utilization in Trucking

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

- (1) The DBE 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 DBE goals.
- (2) The DBE shall itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
- (3) The DBE 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 DBE may subcontract the work to another DBE firm, including an owner-operator who is certified as a DBE. The DBE who subcontracts work to another DBE receives credit for the total value of the transportation services the subcontracted DBE provides on the contract.
- (5) The DBE may also subcontract the work to a non-DBE firm, including from an owner-operator. The DBE who subcontracts the work to a non-DBE is entitled to credit for the total value of transportation services provided by the non-DBE subcontractor not to exceed the value of transportation services provided by DBE-owned trucks on the contract. Additional participation by non-DBE 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 DBE and the Contractor will not count towards the DBE contract requirement.
- (6) A DBE may lease truck(s) from an established equipment leasing business open to the general public. The lease must indicate that the DBE 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 DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. This type of lease may count toward the DBE's credit as long as the driver is under the DBE's payroll.
- (7) Subcontracted/leased trucks shall display clearly on the dashboard the name of the DBE 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.

DBE Replacement

When a Contractor has relied on a commitment to a DBE firm (or an approved substitute DBE firm) to meet all or part of a contract goal requirement, the contractor shall not terminate the DBE 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 DBE subcontractor, a non-DBE subcontractor,

or with the Contractor's own forces or those of an affiliate. A DBE may only be terminated after receiving the Engineer's written approval based upon a finding of good cause for the termination.

All requests for replacement of a committed DBE firm shall be submitted to the Engineer for approval on Form RF-1 (*DBE 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 DBE:

(A) Performance Related Replacement

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

If a replacement DBE is not found that can perform at least the same amount of work as the terminated DBE, 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 DBEs that their interest is solicited in contracting the work defaulted by the previous DBE or in subcontracting other items of work in the contract.
- (2) Efforts to negotiate with DBEs for specific subbids including, at a minimum:
 - (a) The names, addresses, and telephone numbers of DBEs who were contacted.
 - (b) A description of the information provided to DBEs regarding the plans and specifications for portions of the work to be performed.
- (3) A list of reasons why DBE quotes were not accepted.
- (4) Efforts made to assist the DBEs contacted, if needed, in obtaining bonding or insurance required by the Contractor.

(B) Decertification Replacement

- (1) When a committed DBE 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 DBE 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 DBE is decertified prior to the Department receiving the SAF (*Subcontract Approval Form*) for the named DBE firm, the Contractor shall take all necessary and reasonable steps to replace the DBE subcontractor with another DBE subcontractor to perform at least the same amount of work to meet the DBE goal requirement. If a DBE 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 DBE, 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 DBE based upon the Contractor's commitment, the DBE shall participate in additional work to the same extent as the DBE 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 DBEs 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 DBE, the Contractor shall seek participation by DBEs 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 DBE, the Contractor shall seek additional participation by DBEs equal to the reduced DBE 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 DBE subcontractor. The Department reserves the right to require copies of actual subcontract agreements involving DBE 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 DBE 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 DBE credit.

Reporting Disadvantaged Business Enterprise Participation

The Contractor shall provide the Engineer with an accounting of payments made to all DBE 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 DBEs, 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 work on future projects until the required information is submitted.

Contractors reporting transportation services provided by non-DBE 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 on the Department's DBE-IS (*Subcontractor Payment Information*) with each invoice. Invoices will not be processed for payment until the DBE-IS is received.

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.

REQUIRED CONTRACT PROVISIONS FEDERAL - AID CONSTRUCTION CONTRACTS

FHWA - 1273 Electronic Version - May 1, 2012

Z-8

- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

- A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.
3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.
4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:
 - a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.
 - b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."
2. **EEO Officer:** The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.
3. **Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

- a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.
 - b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.
 - c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.
 - d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
 - e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.
4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.
- a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.
 - b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.
 - c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.
5. **Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:
- a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.
 - b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.
 - c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.
 - d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.
6. **Training and Promotion:**
- a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.
 - b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).
 - c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.
 - d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.
7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:
- a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.
 - b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.
 - c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.
 - d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.
8. **Reasonable Accommodation for Applicants / Employees with Disabilities:** The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.
9. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.
- a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.
 - b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.
10. **Assurance Required by 49 CFR 26.13(b):**
- a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.
 - b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. **Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.
- a. The records kept by the contractor shall document the following:
 - (1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;
 - (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and
 - (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;
 - b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

- a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
 - (i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
 - (ii) The classification is utilized in the area by the construction industry; and
 - (iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
 - (2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
 - (3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
 - (4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
 - d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. **Withholding.** The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the

wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency.

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL). Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL). Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage

determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.
- d. Apprentices and Trainees (programs of the U.S. DOT). Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.
5. **Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
6. **Subcontracts.** The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.
7. **Contract termination:** debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
8. **Compliance with Davis-Bacon and Related Act requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
9. **Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.
10. **Certification of eligibility.**
 - a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
 - b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
 - c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
2. **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.
3. **Withholding for unpaid wages and liquidated damages.** The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.
4. **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).
 - a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:
 - (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
 - (2) the prime contractor remains responsible for the quality of the work of the leased employees;
 - (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
 - (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.
 - b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.
3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.
4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.
5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.
2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).
3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:

- a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.
- c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.
- d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such

as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

- f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.
- g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.
- h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.
- i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction 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 to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

2. **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:**

- a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:
 - (1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;
 - (2) 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;
 - (3) 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 (a)(2) of this certification; and
 - (4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
- b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

- a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.
- b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
- c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.
- d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).
- e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
- f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.
- g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.
- h. 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 clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction 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 to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.
2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:
 - a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
 - b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.
3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

ON-THE-JOB TRAINING

(10-16-07) Z-10

(10-16-07) (Rev. 7-21-09)

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. A sample agreement is available at www.ncdot.org/business/ocs/ojt/.

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
Pipe Layers

Mechanics
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.

USDOL WAGE HOUR

General Decision Number: NC120065 07/06/2012 NC65
 Superseded General Decision Number: NC20100102
 State: North Carolina
 Construction Type: Building

Counties: Chowan, Craven, Dare, Gates, Jones, Martin and **Washington** Counties in North Carolina.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Modification Number Publication Date

0 01/06/2012

1 07/06/2012

* PLUM0421-004 07/01/2012

	<u>Rates</u>	<u>Fringes</u>
PIPEFITTER (Excluding HVAC System Installation).....	\$ 24.40	9.25

* SUNC2011-046 08/26/2011

	<u>Rates</u>	<u>Fringes</u>
BRICKLAYER.....	\$ 19.38	8.73
CARPENTER (Drywall Hanging Only).....	\$ 18.13	1.31
CARPENTER (Form Work Only).....	\$ 14.21	0.41
CARPENTER, Excludes Drywall Hanging, and Form Work.....	\$ 14.64	2.39
CEMENT MASON/CONCRETE FINISHER...	\$ 14.02	0.00
ELECTRICIAN.....	\$ 17.10	1.47
HVAC MECHANIC (HVAC Duct Installation Only).....	\$ 15.58	1.53
IRONWORKER, STRUCTURAL.....	\$ 18.75	5.62
LABORER: Common or General.....	\$ 10.57	0.67
LABORER: Landscape & Irrigation.....	\$ 10.29	1.82
LABORER: Mason Tender-Brick/Cement/Concrete.....	\$ 10.00	0.00
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 14.71	2.33
OPERATOR: Crane.....	\$ 19.25	2.37
OPERATOR: Grader/Blade.....	\$ 15.71	1.49
PAINTER: Brush, Roller and Spray.....	\$ 14.36	1.97
PLUMBER (HVAC System Installation).....	\$ 16.96	3.17
PLUMBER, Excludes HVAC System Installation.....	\$ 17.34	2.09
ROOFER.....	\$ 13.55	0.80
SHEET METAL WORKER, Excludes HVAC Duct and System Installation....	\$ 13.09	1.28
TRUCK DRIVER: Dump Truck.....	\$ 12.50	1.21

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers: An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters, PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rate.

Non-Union Identifiers: Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative

Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

GENERAL, PLUMBING, MECHANICAL AND ELECTRICAL CONSTRUCTION

TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGES</u>
	<u>DIVISION 1 - GENERAL REQUIREMENTS</u>	
01010	Summary of the Work	42
01026	Payment and Completion Procedures	44
01031	Alternates and Unit Prices	47
01151	Construction and Demolition Materials Recycling Requirements	48
01200	Progress Documentation and Procedures	51
01300	Submittals	53
	<u>DIVISION 2 - SITE WORK</u>	
02072	Demolition for Remodeling	56
02200	Earthwork	58
02280	Soil Treatment	61
02712	Subdrainage Systems for Structures	63
	<u>DIVISION 3 - CONCRETE</u>	
03310	Structural Concrete	64
	<u>DIVISION 4 - MASONRY</u>	
04220	Brick & Concrete Unit Masonry	68
	<u>DIVISION 5 - METALS</u>	
05120	Structural Steel	70
	<u>DIVISION 6 - WOOD AND PLASTICS</u>	
06100	Rough Carpentry	73
06173	Wood I-Joists	75
06200	Finish Carpentry	77
	<u>DIVISION 7 - THERMAL & MOISTURE PROTECTION</u>	
07160	Bituminous Dampproofing	79
07210	Building Insulation	81
07211	Foamed-In-Place Insulation	83
07411	Preformed Metal Roof Panels	85
07464	Wood-Fiber Cement Siding	88
07625	Sheet Metal Gutters and Downspouts	90
07900	Joint Sealers	92
	<u>DIVISION 8 - DOORS AND WINDOWS</u>	
08110	Steel Doors and Frames	94
08143	Flush Wood Doors	96
08410	Metal-Framed Storefronts	98
08460	Automatic Entrance Doors	101
08541	Fiberglass Windows	103
08710	Door Hardware	106
08800	Glazing	109

DIVISION 9 - FINISHES

09260	Gypsum Board System	111
09300	Tile	113
09840	Acoustic Baffles (Ceiling-Hung Baffles)	116
09900	Painting	118

DIVISION 10 - SPECIALTIES

10100	Visual Display Boards	121
10170	Plastic Toilet Compartments	122
10425	Signs	124
10522	Fire Extinguishers, Cabinets, and Accessories	126
10810	Toilet Accessories	128

DIVISION 11 - EQUIPMENT

Not Used

DIVISION 12 - FURNISHINGS

Not Used

DIVISION 13 - COMPENSATION FOR GENERAL CONTRUCTION

13100	Compensation for General Construction	130
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DIVISION 14 - CONVEYING SYSTEMS

Not Used

DIVISION 15 - PLUMBING AND MECHANICAL

15010	Basic Plumbing Requirements	131
15140	Hangers and Supports	138
15190	Plumbing Identification	142
15250	Plumbing Piping Insulation	144
15410	Plumbing Piping	148
15430	Plumbing Specialties	151
15450	Water Heaters	153
15452	Solar Water Heating System	155
15499	Compensation for Plumbing	157
15500	Basic Mechanical Requirements	158
15501	Hangers and Supports	164
15503	Mechanical Identification	167
15505	Piping Insulation – Refrigeration and Condensate	169
15507	Ductwork Installation	172
15510A	Hydronic Piping	174
15510B	Ground Loop Heat-Pump Piping	177
15745	Water-Source Geothermal Heat Pump	179
15782	Energy Recovery Ventilator	185
15870	Power Ventilators	188
15891	Metal Ductwork	191
15910	Duct Accessories	193
15932	Air Outlets and Inlets	196
15990	Testing, Adjusting and Balancing	199
15999	Compensation for Mechanical	205

DIVISION 16 - ELECTRICAL

16010	Basic Electrical Requirements	206
16050	Basic Electrical Materials and Methods	213
16100	Raceways, Boxes and Cabinets	217
16120	Wires and Cables	222
16140	Wiring Devices	225
16190	Supporting Devices	228
16195	Electrical Identification	231
16452	Grounding	234
16470	Panel Boards	238
16476	Disconnects	241
16515	Interior Lighting	243
16999	Compensation for Electrical	248

ROADSIDE ENVIRONMENTAL UNIT

	Site Demolition	249
	Tree Preservation/Protection Fence	250
	4" Concrete Sidewalks	252
	Landscape and Site Grading	252
	Site Stormwater Drainage	253
	9" Concrete Border	256
	Permeable Interlocking Concrete Pavers	257
	Bench with Brick Base	264
	Relocation of Post Top Light and Telephone Pedestal	265

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01010 – SUMMARY OF WORK

PART 1 – GENERAL

1.01 SUMMARY

- A. The owner is: North Carolina Department of Transportation, 1 S. Wilmington St., Raleigh, NC
- B. Section includes:
 - 1. Project description.
 - 2. Access to the site.
 - 3. Contractor’s use of the premises
 - 4. Coordination requirements
 - 5. Pre-construction meeting

1.02 PROJECT DESCRIPTION

- A. The project consists of the complete renovation/addition to the existing Washington County US-64 Rest Area Building (2,137 sq. ft.)
 - 1. At US-64 east of Plymouth, NC in Washington County, NC.
 - 2. As shown in contract documents for the Washington County US-64 Rest Area building prepared by Facilities Design Unit, NCDOT (Dated October 9, 2012)
- B. The Work consists of:
 - 1. The complete renovation of the existing Rest Area building with additions at the front and rear of the building and the replacement of the existing roof structure, interior finishes, plumbing, mechanical and electrical systems.
 - a. No asbestos containing building material was located in the existing building by an asbestos inspection dated October 14, 1997.
 - b. Demolished materials shall be recycled. (see Section 01151)
 - 2. Concrete entrance sidewalks (see Landscape Spec’s)
 - 3. Building and immediate site rough and finish grading of all disturbed areas (see Landscape Spec’s)
 - 4. The General Contractor is responsible for all layout and surveying of sidewalks, utilities and buildings.

1.03 ACCESS TO THE SITE AND USE OF THE PREMISES

- A. The space available to the Contractor for the performance of the work, either exclusively or in conjunction with others performing other construction as part of the project, is an outdoor space sufficient for storage trailers and access to the construction area from the entrance/exit from US-64 having full use of the rest area site; the rest area facility will be closed to the public for the entire construction period.
- B. Entrance/Exit drives and parking spaces shall remain open for the Contractor’s use.
- C. The Contractor shall provide temporary restroom facilities for the entire construction period.
- D. The Contractor shall provide a construction/office trailer at the construction site, with heating and air conditioning, large enough for his office telephone and fax, layout space for the construction drawings (as-built set and shop drawings) with seating area to hold 12 people for monthly meetings, and for his secured storage of small tools and materials.
- E. Signs: Do not install, or allow to be installed, signs other than specified signs and signs identifying the principal entities involved in the project. NCDOT will provide “Closed” signs at the highway rest area signs and barrels for closing off the entry/exit drives.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. A pre-construction meeting will be held at a time and place designated by the Architect / Engineer, for the purpose of identifying responsibilities of the Owner's and the Architect's personnel and explanation of administrative procedures.

3.02 SECURITY PROCEDURES

- A. Provide secure storage for materials for which the owner has made payment and which are stored on site.
- B. Secure completed work as required to prevent loss.

3.03 COORDINATION

- A. If necessary, inform each party involved, in writing, of procedures required for coordination; include requirements for giving notice, submitting reports, and attending meetings.
 - 1. Inform the Owner when coordination of his work is required.
- B. See other requirements in other portions of the contract documents.
- C. Conduct meetings for the specific purpose of coordination, at least once a month.
 - 1. Attendees shall include:
 - a. Contractor.
 - b. Subcontractors currently working at the site.

END OF SECTION 01010

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 25th 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.
 4. Final Inspection list of incomplete work.
 5. Other data required by the contract documents.

3.05 FINAL COMPLETION PROCEDURES

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

END OF SECTION 01026

SECTION 01031 – ALTERNATES AND UNIT PRICES

PART 1 - GENERAL

1.01 ALTERNATE LIST

- A. **Alternate No. 1:** Alternate No.1: Wood Grain Floor Tile, Timber Glen 8x24 floor tile, in lieu of the Base Bid Continental Slate 18x18 & 12x12 floor tile and 6x12 sanitary base. Price separately the Base Bid Floor Tile work and the additional difference with the Alternate No. 1 Floor Tile.
1. Base Bid Floor Tile as specified in specification Section 09300-Tile , page 09300-1:
 - a. Base Bid Floor Plan shown on Sheet A12, indicates the Base Bid tile with the location of the 18x18 and 12x12 Continental Slate, Moroccan Brown color floor tile.
 2. Alternate No. 1 Floor Tile as specified in specification Section 09300-Tile , page 09300-2:
 - a. Alternate No. 1 Floor Plan shown on Sheet A12, indicates the Alternate No. 1 tile with the location of the 8x24 Timber Glen, Espresso color floor tile. The sanitary base colors are different from the Base Bid to the Alternate floor tile as noted in the specifications and sheet A12.
 3. Indicate the price difference on the Form of Proposal with the add amount (the Alternate No. 1 Floor Tile is expected to be more expensive than the Base Bid Floor Tile).

1.02 UNIT PRICE LIST

- A. **Unit Price No. 1:** Well Depth amount shall be the amount to be "added to" or "deducted from" the base bid Geothermal Well Depth (above or below the allowance) of 1,000 (4-250' wells) Lin. Ft. well depth specified.
1. The Unit Price shall include the total cost per lineal foot difference in drilling and piping of the allowance amount.
 2. The Base Bid shall include an allowance of 1,000 Lin. Ft. or 4-250 Lin. Ft. wells.
 3. As indicated on drawing sheet M2.

1.03 CONTRACT CONSIDERATIONS

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01230

SECTION 01151 - CONSTRUCTION AND DEMOLITION MATERIALS RECYCLING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

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

1.02 DEFINITIONS

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

1.03 SUBMITTALS

- A. Contractor's Construction Waste and Recycling Plan
 - 1. Review Contract Documents and estimate the types and quantities of materials under the Work that are anticipated to be feasible for on-site processing, source separation for re-use or recycling. Indicate the procedures that will be implemented in this program to effect jobsite source separation, such as, identifying a convenient location where dumpsters would be located, putting signage to identify materials to be placed in dumpsters, etc.
 - 2. Prior to commencing the Work, submit Contractor's Construction Waste and Recycling Plan. Submit in format provided (**Section 01151A**). The Plan must include, but is not limited to the following:
 - a. Contractor's name and project identification information;
 - b. Procedures to be used;
 - c. Materials to be re-used and recycled;
 - d. Estimated quantities of materials;
 - e. Names and locations of re-use and recycling facilities/sites;
 - f. Tonnage calculations that demonstrate that Contractor will re-use and recycle a minimum 50% by weight of the construction waste materials generated in the Work.
 - g. Cost of local tip fees for non-recycled material/ton

- h. Cost or revenue generated from recycled material, per category, per ton (note: cost and revenue are to be managed by the General Contractor as part of the Work; tonnage, cost, and savings information are to be provided to the Architect for tracking purposes only)
- 2. Contractor's Construction Waste and Recycling Plan must be approved by the Architect prior to the start of Work.
- 3. Contractor's Construction Waste and Recycling Plan will not otherwise relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.

B. Contractor's Reuse, Recycling, and Disposal Report

- 1. Submit Contractor's Reuse, Recycling, and Disposal Report on the form provided (**Section 01151B**) with each application for progress payment. Failure to submit the form and its supporting documentation will render the application for progress payment incomplete and delay progress payments. If applicable, include manifests, weight tickets, receipts, and invoices specifically identifying the Project for re-used and recycled materials:
 - a. Reuse of building materials or salvage items on site
 - b. Salvaging building materials for reuse
 - c. Recycling source separated materials on site, with approval
 - d. Recycling source separated material at an off site recycling center
 - e. Delivery of soils or mixed inerts to an inerts landfill for disposal (inert fill).
 - f. Disposal at a landfill or transfer station (where no recycling takes place).
 - g. Other (describe).

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

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

3.011 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.

3.2 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.

3.043 REVENUE

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

END OF SECTION

SECTION 01200 - PROGRESS DOCUMENTATION AND PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 SUBMITTALS

- A. Contractor's Construction Schedule.
 - 1. Submit within 14 days after execution of contract.
 - 2. Submit revised schedule with application for payment to 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

DIVISION 2 - SITE WORK

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

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 to be demolished. The owner does not warrant that the condition of structures to be demolished 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.

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

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 1, 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.

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.
 - 2. 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 overstraining.
- 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 exterior side 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 that 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

DIVISION 3 - CONCRETE

SECTION 03310 - STRUCTURAL 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. 10 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.
 - 2. Slabs: 4000 psi.
- 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 2 percent and 4 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 15 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 thinset tile.

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.

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 03310

DIVISION 4 - MASONRY

SECTION 04220 – BRICK & CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Brick, concrete masonry units foundation walls, and precast sill & veneer shapes.
 - 2. Mortar and grout, reinforcement, anchorage, and accessories.

PART 2 - PRODUCTS

2.01 BRICK MASONRY UNITS

- A. Facing Brick: ASTM C 216, and shall match existing brick veneer walls.
 - 1. Submit samples.

2.02 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" & 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.
- B. Sill & Veneer Units: Franklin Stone, Northfield, or Oldcastle Co. white Portland Cement shaped units in "Monumental White" finish; brick caps-Sill Units 3-5/8"h x 5-5/8" w x 47-5/8" long; and bench-Veneer Units 3-5/8"h x 11-5/8"w x 23-5/8" long.

2.03 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.

2.04 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.

2.05 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.

2.06 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.
 - 3. Locations indicated on the drawings: Type S.
 - 4. Applications as follows: Type N.
 - a. Exterior, above-grade walls.
 - b. Locations for which another mortar type has not been specifically indicated.

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 MASONRY CONSTRUCTION - GENERAL

- A. Pattern Bond: Lay exposed masonry in running bond except where other bonds are indicated at special features.
 - 1. Lay concealed masonry in running bond, or lap units at least 2 inches.
- B. Expansion and Control Joints: Build in movement joints where indicated, installing accessory items as masonry is constructed.

3.03 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.

3.04 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.

3.05 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

DIVISION 5 - METALS

SECTION 05120 - STRUCTURAL STEEL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fabrication and erection of structural steel framing members, as defined in AISC Code and as indicated on the drawings.
2. Shop painting.

1.02 SUBMITTALS

- A. Product Data:** Producer's or manufacturer's information for products as follows, including sufficient data to show compliance with specified requirements:
1. Mill test reports for each type of structural steel furnished.
 2. Specifications for primer paint, including manufacturer's data on chemical composition, adhesion of spray fireproofing, and dry film thickness per applied coat.
 3. Specifications for nonshrink grout.
- B. Shop Drawings:** Complete drawings for structural steel, including information on location, type, and size of all connections, distinguishing between those made in the shop and those made in the field.

1.03 QUALITY ASSURANCE

- A. Welding Procedures:** Establish that joint welding procedures are prequalified or test in accordance with American Welding Society (AWS) qualification procedures.
- B. Regulatory Requirements:** Unless other requirements of governing authorities or particular requirements of this specification are more stringent, comply with provisions of the following:
1. AISC "Code of Standard Practice for Steel Buildings and Bridges."
 2. AISC "Specification for Structural Steel Buildings—Allowable Stress Design and Plastic Design," with Commentary and Supplements.
 3. AWS D1.1, "Structural Welding Code - Steel."
- C. Testing and Inspection Agency:** The owner will engage an independent testing and inspection agency to perform testing, inspect and evaluate connections, and prepare test reports.
1. Correct deficiencies in the structural steel work identified by the testing and inspection agency at no additional expense to the owner. Subsequent tests to confirm the adequacy of corrected work will be at the contractor's expense.

PART 2 - PRODUCTS

2.01 STEEL MATERIALS

- A. Structural Steel Members:** ASTM A 36.
- B. Steel Pipe:** ASTM A 53, Type and grade: Type E, Grade B.
- C. Cold-Formed Structural Tubing:** ASTM A 500, Grade B.
- D. Hot-Formed Structural Tubing:** ASTM A 501, seamless or welded.
- E. Anchor Bolts:** ASTM A 307, Carbon steel, Grade C; ASTM A 36 steel plate washers.
- F. Carbon Steel Bolts and Nuts:** ASTM A 307, Grade A.
- H. High-Strength Bolts, Nuts, and Washers:** ASTM A 325.
1. Type 1, plain (medium carbon steel).
- F. Direct Tension Indicators:** Load indicator washers or snap-off high-strength bolts certified to provide the minimum fastener tension in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts" may be used at connections requiring high-strength bolts, at the contractor's option.

2.02 MISCELLANEOUS MATERIALS

- A. Welding Electrodes and Fluxes:** AWS D1.1; types as required by materials being welded.
- B. Nonshrink Grout:** Prepackaged material requiring only the addition of water and complying with ASTM C 1107, and as follows:
1. Natural aggregate (nonmetallic) type.

- C. Shop Primer: Rust-inhibitive, lead and chromate free, low VOC primer, complying with FS TT-P-664, or equivalent.

2.03 FABRICATION

- A. Shop Assembly - General: Comply with requirements of AISC Specifications. Shop fabricate and assemble to maximum degree possible.
- B. Connections:
 - 1. Shop connections: Welded or bolted, as required.
 - 2. Field connections: Welded or bolted, as required.
 - 3. Bolts: High-strength steel bolts, except as otherwise indicated.
 - a. Bolting: Comply with requirements of AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
 - 4. Welds: Comply with requirements of AWS Code for welding procedures and quality of welds, including appearance.
- C. Finishing: Accurately mill ends of columns and other members which must transmit loads in bearing.

2.04 SHOP COATING - PAINT

- A. Shop prime all steel members.
- B. Preparation: Thoroughly clean steel surfaces to be shop primed, removing loose rust, loose mill scale, dirt, oil, and grease. Clean steel in accordance with SSPC procedures as follows:
 - 1. Power tool or blast cleaning: SSPC SP-3, -5, -6, or 10.
- C. Painting: As soon as possible after cleaning, apply rust-inhibiting gray primer paint in accordance with instructions of paint manufacturer, at a rate sufficient to provide a finished thickness of not less than 1.5 mils and an average thickness of 2.0 mils.

2.05 SHOP QUALITY CONTROL

- A. Testing and Inspection:
 - 1. General: Provide access to testing and inspection agency so that specified testing and inspection can be safely accomplished.
 - 2. Shop bolted connections: Comply with testing and verification procedures in AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
 - 3. Shop welded connections: Inspect and test shop-fabricated welds as follows:
 - a. Visually inspect all welds.

PART 3 - EXECUTION

3.01 ERECTION

- A. General: Erect structural steel in compliance with AISC Code and Specifications.
- B. Assembly:
 - 1. Set structural members accurately to locations and elevations indicated, within tolerances established in AISC Code, before making final connections.
 - 2. Do not use thermal cutting to correct fabrication errors on any major structural member.
- C. Columns and Bearing Surfaces:
 - 1. Clean bearing and contact surfaces before assembly. Slightly roughen concrete and masonry surfaces to improve bond.
 - 2. Set base and bearing plates accurately, using metal wedges, shims, or setting nuts as required.
 - 3. After tightening anchor bolts and ensuring that structure is plumb, grout solidly between plates and bearing surfaces.
- D. Bolting:
 - 1. Carbon steel bolts: Use only for temporary bracing during erection, unless otherwise specifically permitted by contract documents.
 - 2. High-strength bolts: Comply with requirements of AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
- E. Welding:
 - 1. Perform field welding in accordance with AWS "Structural Welding Code - Steel."
 - 2. Tighten and leave in place erection bolts used in field-welded construction.

3.02 FIELD QUALITY CONTROL

- A. Testing and Inspection:

1. General: Provide access to testing and inspection agency so that specified testing and inspection can be safely accomplished.
2. Field-bolted connections: Comply with testing and verification procedures in AISC “Specification for Structural Joints Using ASTM A325 or A490 Bolts.”
3. Field-welded connections: Inspect and test field-fabricated welds as follows:
 - a. Visually inspect all field welds.

END OF SECTION 05120

DIVISION 6 - WOOD AND PLASTICS

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Rough carpentry for:
 - a. Wood framing and sheathing for the new **Rest Area building additions**.
 - b. Miscellaneous lumber for attachment and support of other work.
 - c. See Section 06173 for Wood I-Joists.
 - 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.
- C. Treated Wood: Treating plant's instructions for use, including storage, cutting, and finishing.
 - 1. Pressure preservative treatment: Treating plant's certification of compliance with specified standards and stating process employed and preservative retention values.
 - a. Treatment for above-ground use: Certification of kiln drying after treatment.

1.03 QUALITY ASSURANCE

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

PART 2 – PRODUCTS

2.01 DIMENSION LUMBER

- A. Size: Provide nominal sizes indicated, complying with NIST PS 20 except where actual sizes are specifically required. Provide continuous members; splicing is not acceptable.
 - 1. Surfacing: Dressed lumber (S4S).
 - 2. Moisture content: Kiln-dry or MC15 (15 percent maximum moisture content).
- 3. B. Stud Framing -- 2 x 4 through 2 x 10: Grade: No. 2 (Structural Light Framing).
- 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: See Section 06173 - Wood I-Joists
 - 1. 9-1/2" GPI 20 wood I beams roof joists, 24" o.c., see Section 06173 - Wood I-Joists. Provide overhang extensions, stiffeners, blocking, adjustable slope hangers, and ridge supports as recommended by the manufacturer.
 - 2. GP Lam LVL (or equal) 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)^{1/9}.
- 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

- 4. 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.

- C. Air Infiltration Barrier: Spunbonded olefin or woven polyolefin sheet, UV-stabilized, for building wrap.
 - 1. The following products or approved equal, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - a. **"Styrofoam Weathermate Plus*, Brand Housewrap"**, The Dow Chemical Co.; "Tyvek"; or "Amowrap".
- D. Sill Sealer Gaskets: Glass fiber insulation strips; uncompressed thickness, 1 inch (1/32 inch compressed); width to match sill members.

2.04 WOOD TREATMENT BY PRESSURE PROCESS

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

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

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

3.02 MISCELLANEOUS CARPENTRY

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

3.03 WOOD FRAMING - GENERAL

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

3.04 INSTALLATION OF CONSTRUCTION PANELS

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

3.05 AIR INFILTRATION BARRIER

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

END OF SECTION 06100

SECTION 06173 - WOOD I-JOISTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wood I-joists for roof framing.
- B. Bridging, bracing, and anchorage.
- C. Framing for openings.

1.02 RELATED REQUIREMENTS

- A. Section 06100 - Rough Carpentry: Installation requirements for miscellaneous framing.

1.03 REFERENCE STANDARDS

- A. ASTM D2559 - Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions; 2010a.
- B. ASTM D5055 - Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists; 2010.
- C. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.

1.04 DESIGN REQUIREMENTS

- A. Design Roof Live and Dead Load: 30 lbs/sq ft with deflection limited to 1/240 of span.

1.05 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's literature describing materials, dimensions, allowable spans and spacings, bearing and anchor details, bridging and bracing requirements, and installation instructions; identify independent inspection agency.
- C. Shop Drawings: Indicate sizes and spacing of joists, bracing and bridging, bearing stiffeners, holes to be cut (if any), and framed openings between joists.
- D. Certificate: Certification by joist manufacturer that products delivered are of the same design and construction as those evaluated by the independent inspection agency.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in manufacturer's original packaging with manufacturer's name and product identification intact and legible.
- B. Protect products from damage due to weather and breakage.
- C. Protect joists from warping or other distortion by stacking in upright position, braced to resist movement, with air circulation under coverings and around stacks.
- D. Handle individual joists in the upright position.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood I-Joists:
 - 1. Georgia-Pacific Corporation; Product GPI 20 / GP Lam LVL: www.gp.com.
 - 2. LP Building Products: www.lpcorp.com.
 - 3. iLevel by Weyerhaeuser: www.ilevel.com.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

- A. Wood I-Joists: Solid lumber top and bottom flanges and oriented strand board (OSB) webs bonded together with structural adhesive, with published span rating to meet project requirements.

1. Span Rating: Established and monitored in accordance with ASTM D5055 by independent inspection agency.
 2. Oriented Strand Board: Comply with PS 2.
 3. Adhesive: Tested for wet/exterior service in accordance with ASTM D2559.
 4. Depth: 9-1/2 inches.
 5. Fabrication Tolerances:
 - a. Flange Width: Plus/minus 1/32 inch.
 - b. Flange Thickness: Minus 1/16 inch.
 - c. Joist Depth: Plus 0, minus 1/8 inch.
 6. Marking: Mark each piece with depth, joist spacing, and allowable span for joist spacing.
 7. Provide bearing stiffeners if required by span rating or joist hanger manufacturer.
- B. Wood-Based Components:
1. Wood fabricated from old growth timber is not permitted.
 2. Provide wood harvested within a 500 mile radius of the project site.
- C. Joist Bridging: Type, size and spacing recommended by joist manufacturer.
- D. Wood Blocking, Plates, and Miscellaneous Framing: Softwood lumber, any species, construction grade, maximum moisture content of 19 percent.
- E. Fasteners: Electrogalvanized steel, type to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that supports and openings are ready to receive joists.

3.02 PREPARATION

- A. Coordinate placement of bearing items.

3.03 ERECTION

- A. Install joists in accordance with manufacturer's instructions.
- B. Set structural members level and plumb, in correct position.
- C. Make provisions for erection loads and for sufficient temporary bracing to maintain structure plumb and in true alignment until completion of erection and installation of permanent bracing.
- D. Install permanent bridging and bracing.
- E. Install headers and supports to frame openings required.

3.04 TOLERANCES

- A. Framing Members: 1/2 inch maximum, from true position.

END OF SECTION

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Wood trim (window & display case), corner boards and wood shelving units.
- B. Beadboard Panels for Lobby and corridor walls.
- C. Fiber-cement lap siding, siding panels, and trim see Section 07460.

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. Plain sawn Red Oak at display cases and Western Red Cedar window picture frame trim.
 - b. "Pine": Plain sawn Spruce or Idaho white pine at window extensions, and storage shelving.
 - c. Western Red Cedar for interior beam and horizontal band boards for walls and ceilings at the rest area building.
 - 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.
 - 2. Plywood in concealed locations: Comply with NBS PS 1, Grade C minimum.

2.03 BEADBOARD PANELS:

- A. Beadboard Panels: 5/8" thick premium MDF, Medium Density Fiber, 8" x 8' x 5/8" thick panels, with deep beads on one side, 3-sets of beads at 2-5/8" o.c., reverse side with 2-sets of beads at 4" o.c., cut to size, provide 2x4 horizontal blocking at 24" o.c., equal to American Beadboard.com, provide 5/8" x 5/8" Base molding and 1 x 4 Cedar Top Cap with 3/4" Poplar or Pine "Rope" molding. Other approved equal manufacturers maybe by Baird Brothers Sawmill or EverTrue or Vintage Woodworks solid Pine, Poplar, Cedar, or MDF panels 5/8" thick, prime painted. Installed face bead width shall be approximately 2-5/8" o.c.

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.
 - 3. 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

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

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. See Section 07211- Foamed-In-Place Insulation.

1.02 DEFINITIONS

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

1.03 SUBMITTALS

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

1.04 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide manufacturer's standard preformed insulation units, sized for proper fit in indicated applications.
- B. Blanket/Batt Insulation: Where installation of blanket/batt insulation is indicated, glass fiber blanket/batt complying with requirements below.
- C. Extruded Polystyrene Board Insulation: Manufactured by extrusion process with integral high density skin:
 - 1. Type VII (ASTM C 578): 60.0 psi compressive strength.
 - 2. Total R-value: 7.5.
 - 3. Manufacturers: Products of the following manufacturers or approved equal, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - a. Amoco Foam Products Company.
 - b. Dow U.S.A.
 - c. DiversiFoam Products Company.
 - d. UC Industries, Inc.

2.02 ACCESSORIES

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

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with insulation manufacturer's recommendations and installation sequence. Provide permanent placement and support of insulation.
 - 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 07211 - FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Foamed-in-place insulation.
 - 1. In exterior framed walls and ceilings.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2006.
- C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2010.
- D. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2003.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, insulation properties, and preparation requirements.
- C. Certificates: Certify that products of this section meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing work of the type specified, with minimum one years of experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for concealment limitations.

1.07 FIELD CONDITIONS

- A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.
- B. Do not apply foam when temperature is within 5 F of dew point.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Foamed-In-Place Insulation:
 - 1. BASF Polyurethane Foam Enterprises LLC: www.basf.us.
 - 2. Bayer MaterialScience; EcoBay CC : www.spf.bayermaterialscience.com.
 - 3. Demilec (USA) LLC; HeatLoc Soy-200: www.demilecusa.com.
 - 4. Icynene Inc; Icynene LD-C-50: www.icynene.com.
 - 5. NCFI Polyurethanes: www.ncfi.com.
 - 6. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

- A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
 - 1. Aged Thermal Resistance (R-value): 6.5 (deg F hr sq ft)/Btu, minimum, when tested at 1 inch thickness in accordance with ASTM C518 after aging for 180 days at 41 degrees F.
 - 2. Water Vapor Permeance: Vapor retarder; 1 perm, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
 - 3. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.

4. Air Permeance: 0.004 cfm/sq ft, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.5 psf.
5. Closed Cell Content: At least 90 percent.
6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify work within construction spaces or crevices is complete prior to insulation application.
- B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation adhesion.

3.02 PREPARATION

- A. Mask and protect adjacent surfaces from over spray or dusting.
- B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

- A. Apply insulation in accordance with manufacturer's instructions.
- B. Apply insulation by spray method, to a uniform monolithic density without voids.
- C. Apply to a minimum cured thickness of 3 at walls and 6 inch at ceilings/roofs.
- D. Patch damaged areas.
- E. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
- F. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.04 FIELD QUALITY CONTROL

- A. Inspection will include verification of insulation thickness and density.

3.05 PROTECTION

- A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

SECTION 07411-PREFORMED METAL ROOF PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural roofing system of preformed aluminum panels (new **Rest Area building**).
- B. Fastening system.
- C. Factory finishing.
- D. Accessories and miscellaneous components.

1.02 RELATED REQUIREMENTS

- A. Section 06150 - Wood Decking: Roof sheathing.
- B. Section 07900 - Joint Sealers: Field-installed sealants.

1.03 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2005.
- B. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2007.
- C. ASTM B 209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2007.
- D. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2006.
- E. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; 2006.

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.
- 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.

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 20 year period from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable manufacturers or approved equal are:
 - 1. Architectural Building Components: www.archmetalroof.com.
 - 2. Construction Metal Products, Inc., (704) 871-8704 www.constructionmetalproducts.com.
 - 3. **Petersen Aluminum Corporation***: www.pac-clad.com.

2.02 ARCHITECTURAL ROOF PANELS

- A. Performance Requirements: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Metal Roofing: Factory-formed panels with factory-applied finish.
 - 1. Aluminum Panels:

- a. Alloy: Aluminum conforming to ASTM B 209/B 209M; temper as required for forming.
- b. Thickness: Minimum 0.032 inch (0.8 mm).
2. Profile: Standing seam, with minimum 1.75 inch seam height; concealed fastener system lapped seam in standing seam profile, or CMP S-2000 Lok Seam System.
3. Texture: Smooth.
4. Length: Full length of roof slope, without lapped horizontal joints.
5. Width: Maximum panel coverage of 16 inches with stiffening beads.

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. Fluoropolymer Coating System: Manufacturer's standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 0.9 mil (0.023 mm); color and gloss "Silver" and "Award Blue" (**Petersen Aluminum**) for all metal items; Valspar Fluoropon SR; solar reflectance <0.29; metallic color (Award Blue roof panels to be used at the Tower roof only).

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. Soffit: Half vent.
- D. 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.
- E. Underlayment for Wood Substrate: ASTM D 226 roofing felt, perforated type; covered by water-resistant rosin-sized building paper.
- F. 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.
- G. Snow Guards: Approved equal to Sno Gem polycarbonate snow guards with adhesive fastening to the standing seam panel and manufacturer's instructions.

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.

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. Ice Protection Underlayment: Install self-adhering ice protection underlayment along full length of eaves from the eave edge to a point 24 inch minimum beyond the 4/12 upper roof slope, and at valley's in accordance with underlayment manufacturer's installation instructions.
- 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

SECTION 07460 – SIDING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Fiber-Cement panels and lap-siding (**Rest Area building**).
 - 2. Soffits and trim.

1.02 REFERENCES

- A. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 1997a.
- B. WWPA G-5 - Western Lumber Grading Rules; Western Wood Products Association; 1998.

1.03 SUBMITTALS

- A. Product Data: Submit product data and manufacturer's recommended installation instructions.
- B. Samples: Submit two 12-inch samples for each siding material and finish.
- C. Contract Closeout Submittals: Warranty.

1.04 WARRANTY

- A. General: Warranties shall be in addition to, and not a limitation of, other rights the owner may have against the contractor.
- B. Fiber-Cement Fascia Trim, Soffit Panels: Furnish manufacturer's standard warranty.
 - 1. Warranted against defects in siding substrate for 50 years.

PART 2 - PRODUCTS

2.01 FIBER-CEMENT & HARDWOOD PRODUCTS

- A. Manufacturer: Provide products complying with requirements of the contract documents and made by the following: **James Hardie Building Products*** or equal to CertainTeed, or GAF-Weaterside or approved equal; 8" x 5/16" thick lap siding at the 1-story wings and 4' x 10' x 5/16" thick panels at the center 2-story.
- B. Surface Burning Characteristics: Maximum flame spread: 25. Maximum smoke developed: 450.
- C. ColorPlus Color: **Arctic White, Harris Cream, and Evening Blue** (for Tower siding; see Painting Section).
- D. Trim/Fascia: 3/4" thick Fiber-Cement with ColorPlus color.
- E. Corner Boards: 5/4 or 1" thick corner boards with ColorPlus color.
- F. Perforated Soffit Panels: 1/4" thick Fiber-Cement with ColorPlus color.
- G. ColorPlus Sealant: Caulking shall match lap siding color at corner boards.
- H. Fasteners:
 - 1. Factory Paint: Hot-dip galvanized box nails; match ColorPlus color at exposed trim nailing.

2.03 UNDERLAYMENT AND ACCESSORIES

- A. House wrap over exterior OSB sheathing, see Rough Carpentry.
- B. Nails: Hot dipped galvanized type; non-staining, of size and strength to securely and rigidly retain the work.

PART 3 - EXECUTION

3.01 FIBER-CEMENT FASCIA & TRIM INSTALLATION

- A. General:
 - 1. Install siding in accordance with manufacturer's instructions.
 - 2. Position cut ends over bearing surfaces. Sand cut edges smooth and clean.
- B. Installation:
 - 1. Drive nails 90 degrees to surface. Drive nail heads to siding surface without breaking siding surface. Do not overdrive. Do not countersink.
 - 2. Blind nail lap siding, nail at each framing line, positioning nails as per manufacturer's installation instructions.
- C. Install panel siding sheets horizontally with edges and ends over firm bearing, blind nail where possible.
- D. Maximum Variation From Plumb and Level: 1/4 inch per 10 feet.
- F. Prepare for site finishing specified in Section 09900.

3.02 SEALANTS

A. Lap Siding:

1. Use concealed beads where practicable. Do not use exposed beads of sealant except where concealed application is not possible.

END OF SECTION 07460

SECTION 07625 - SHEET METAL GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Gutters and downspouts for the new **Rest Area buildings** and **existing Vending buildings**.

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

DIVISION 8 - DOORS AND WINDOWS

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.
- B. Fire-Rated Door Assemblies: In compliance with NFPA 80 and labeled per ASTM E 152 by agency acceptable to governing authorities.

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. Grade II - Heavy-Duty, 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.
 2. Fire-rated doors: Comply with NFPA 80 requirements and clearances.

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 08143 - STILE AND RAIL WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wood doors and frames, stile and rail design.

1.02 RELATED REQUIREMENTS

- A. Section 06200 - Finish Carpentry: Wood door frames.
- B. Section 09900 - Painting and Coating: Site finishing doors.

1.03 REFERENCE STANDARDS

- A. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate stile and rail core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, factory machining criteria.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.
- E. Warranty, executed in NCDOT's name.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Include coverage for warping beyond specified installation tolerances and defective materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Stile and Rail Wood Doors:
 1. Eggers Industries: www.eggersindustries.com,
 2. Maiman Company: www.maiman.com,
 3. Marshfield DoorSystems, Inc.: www.marshfielddoors.com, or equal.

2.02 DOORS

- A. Quality Level: Knotty Red Adler, Knotty Cherry, or Knotty Red Maple species, Custom Grade, in accordance with AWI/AWMAC/WI Architectural Woodwork Standards.
- B. Interior Doors: 1-3/4 inches thick; solid lumber construction; with crossbucks; mortised and tenoned joints.

2.03 ACCESSORIES

- A. Door Frame and Trim: Wood, of same species as door 5/4 frame (hardwood) and 1x4 trim shape, butted corners; prepared for countersink style screws.

2.04 DOOR CONSTRUCTION

- A. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- B. Factory fit doors for frame opening dimensions identified on shop drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and AWI/AWMAC Quality Standards requirements.
- B. Trim door width by cutting equally on both jamb edges.
- C. Trim door height by cutting bottom edges to a maximum of 3/4 inch.
- D. Machine cut for hardware.
- E. Coordinate installation of doors with installation of frames and hardware.

3.02 TOLERANCES

- A. Conform to specified quality standard for fit, clearance, and joinery tolerances.

3.03 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.

3.04 SCHEDULE - See Drawings.

END OF SECTION

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.
- B. Other Acceptable Manufacturers:
 - 1. United States Aluminum Corp.
 - 2. Vistawall Architectural Products: 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: Bronze.
- 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; **White** 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, 1/4" high maximum; provide on all doors.
- F. Closers: Surface mounted on interior.
 - 1. Provide on all doors.
- G. Locks: Dead latch with turn handle inside; keyed cylinder outside.
 - 1. Provide on all doors.

2.06 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners and attachments to conceal from view.

- E. Reinforce components internally for door hardware.
- F. Reinforce framing members for imposed loads.
- G. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
 - 1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

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

3.03 ERECTION TOLERANCES

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

3.04 ADJUSTING

- A. Adjust operating hardware for smooth operation.

3.05 CLEANING AND PROTECTION

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

END OF SECTION

SECTION 08460 - AUTOMATIC ENTRANCE DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Automatic sliding doors, with frames.
- B. Actuators and safety devices.

1.02 REFERENCES

- A. BHMA A156.10 - American National Standard for Power Operated Pedestrian Doors; Builders Hardware Manufacturers Association; 1999 (ANSI/BHMA A156.10).
- B. BHMA A156.19 - American National Standard for Power Assist and Low Energy Power Operated Doors; Builders Hardware Manufacturers Association; 1997 (ANSI/BHMA A156.19).
- C. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 1998.
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; 1999.
- E. UL (ECMD) - Electrical Construction Materials Directory; Underwriters Laboratories Inc.; current edition.
- F. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Underwriters Laboratories Inc.; 1995.

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
- C. Product Data: Provide data on system components, sizes, features, and finishes.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and manufacturer's hardware and component templates.
- E. Maintenance Data: Include manufacturer's parts list and maintenance instructions for each type of hardware and operating component.
- F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.05 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a 1 year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty for motor and compressor.

1.06 MAINTENANCE SERVICE

- A. Provide service and maintenance of operating equipment for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Automatic Entrance Doors: Dormatic, **Horton* Series 2310** or Stanely or NABCO Entrances or Dorma or approved equal.

2.02 AUTOMATIC ENTRANCE DOORS

- A. Automatic Sliding Door Type 1A: Single leaf track-mounted, electric operation, extruded aluminum glazed door, with frame, and operator concealed overhead.
- B. Finish: **White** painted fluorocarbon, 20-year finish.

2.03 LAMINATED GLASS

- A. Laminated Glass: 1" thick laminated safety insulated glass, see Section 08800.

2.04 DOOR OPERATORS

- A. Door Operators - General Requirements: Comply with BHMA A156.10, BHMA A156.19 and UL 325, as applicable.
- B. Door Locking: Provide electronic locking from interior for securing door at maintenance times with Adams Rite 8600 panic device; with key control on the outside of each exterior door; and an on/off key switch on the interior side of each door.
- C. Egress Function: Provide emergency egress function in compliance with the 2012 NCSBC, Section 1008.1.3 and 1008.1.4.3.

2.05 ACTUATORS

- A. Proximity Detector Actuator: Microwave; distance of control sensitivity adjustable.

2.06 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Electrical Characteristics:
- B. Motors: NEMA MG 1.
- C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
- D. Disconnect Switch: Factory mount disconnect switch in control panel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.
- B. Coordinate installation of components with related and adjacent work; level and plumb.

3.03 ADJUSTING

- A. Adjust door equipment for correct function and smooth operation.

3.04 CLEANING

- A. Remove temporary protection, clean exposed surfaces.

3.05 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation, operating components, adjustment features, and lubrication requirements.

END OF SECTION

SECTION 08541 - FIBERGLASS WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Factory fabricated fiberglass windows with fixed and operating sash.
- B. Factory glazed.
- C. Operating hardware.
- D. Insect screens.
- E. Perimeter sealant.

1.02 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors; American Architectural Manufacturers Association; 2008.
- B. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; American Architectural Manufacturers Association; 2009.
- C. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004.
- D. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2002 (Reapproved 2010).
- E. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- F. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2000 (Reapproved 2008).
- G. FS L-S-125 - Screening, Insect, Nonmetallic; Federal Specifications and Standards; Revision B, 1972.

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, anchorage and fasteners, glass, internal drainage details.
- C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work, installation requirements.
- D. Manufacturer's Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in NCDOT's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.
- B. Jig, brace, and box the window frame assemblies for transport to minimize flexing of members or joints.

1.06 FIELD CONDITIONS

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

1.07 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Provide ten year manufacturer warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same. Include coverage for degradation of color finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fiberglass Windows:

1. **Pella Corporation**; Product “**Impervia**”*.
2. Andersen Windows & Doors; Product “100 Series”.
3. Marvin Windows & Doors; Product “Integrity”.
4. Owens Corning; Product “Innovision Windows”, or approved equal.

2.02 WINDOW UNITS

- A. Fiberglass Windows: Hollow, tubular, multi-layer fiber reinforced material; factory fabricated; with vision glass, related flashings, anchorage and attachment devices.
 1. Performance Requirements: AAMA/WDMA/CSA 101/I.S.2/ A440 - 05.
 2. Configuration: Double hung, fixed, and top hinged awning.
 3. Color: White.
- B. Performance Requirements:
 1. System Design: Design and size components to withstand dead and live loads caused by pressure and suction of wind acting normal to plane of window.
 - a. Calculate design pressures in accordance with ASCE 7.
 - b. Measure performance of units by testing in accordance with ASTM E330, using test pressure equal to 1.5 times the design wind pressure and 10 second duration of maximum load.
 2. Deflection: Limit member deflection to 1/200 of the longer dimension with full recovery of glazing materials.
 3. Assembly: To accommodate, without damage to components or deterioration of seals, movement between window and perimeter framing, deflection of lintel.
 4. Air Infiltration: Limit air infiltration through assembly to 0.3 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 E283.
 5. Vapor Seal: No vapor seal failure at interior static pressure of 1 inch, 72 degrees F, and 40 percent relative humidity.
 6. Water Leakage: None, when measured in accordance with ASTM E331.
 7. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.
 8. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound. Position thermal insulation on exterior surface of air barrier and vapor retarder.
 9. Thermal Movement: Design sections to permit movement caused by thermal expansion and contraction of fiberglass to suit glass, infill, and perimeter opening construction.

2.03 COMPONENTS

- A. Fixed Frames: 3-1/16 inch wide x 3 inch deep profile; applied glass stops of screw fastened type.
 1. Type: Nailing flange (for new windows).
 2. Frame Corners: Mitered and joined with nylon corner locks.
- B. Mullion: 6-9/16 inch wide x 3 inch deep profile.
- C. Sills: 1-1/8 inch nominal thickness, pultruded fiberglass; sloped for positive wash; fit under sash to 1/2 inch beyond wall face; one piece full width of opening.
- D. Grilles: Between-the-glass:
 1. Size: 3/4 inch.
 2. Shape: Contoured.
 3. Color: Match sash.
 4. Pattern: Rectangular - 6 lite.
- E. Insect Screen Frame: Rolled aluminum frame of rectangular sections; fit with adjustable hardware; nominal size similar to operable glazed unit.
- F. Insect Screens: 14/18 mesh, glass fiber strands.
 1. Color: Charcoal.
- G. Operable Sash Weather Stripping: Wool pile/vinyl bubble; permanently resilient, profiled to effect weather seal.
- H. Fasteners: Stainless steel.

2.04 GLASS AND GLAZING MATERIALS: Clear and Low-E 11/16" to 1" thick insulating glass:

- A. Clear Insulating Glass (Center Glass Values): 2.5 mm glass; 0.48 Winter U-Factor; 0.91 Shading Coefficient; 0.79 Solar Heat Gain Coefficient; 83% Visible Light Transmission.
- B. Low-E Insulating Glass (Center Glass Values): 2.5 mm glass; 0.25 Winter U-Factor; 0.48 Shading Coefficient; 0.42 Solar Heat Gain Coefficient; 73% Visible Light Transmission.

2.05 SEALANT MATERIALS

- A. Perimeter Sealant and Backing Materials: Type as specified in Section 07900.

2.06 HARDWARE

- A. Awning Sash: Zinc die-cast steel worm-gear operator with Painted finish.
 - 1. Operator Linkage, Hinge Slide, and Hinge Arms: 300 series stainless steel.
 - 2. Awning Sash Lock: Folding arm crank.
- B. Double Hung Sash: Metal and nylon spiral friction slide cylinder, each sash, each jamb.
 - 1. Sash Lock: Self-aligning, cam-action lock.
- C. Finish For Exposed Hardware: Match window finish.

2.07 FABRICATION

- A. Fabricate framing, mullions and sash members with fusion welded corners and joints, in a rigid jig. Supplement frame sections with internal reinforcement where required for structural rigidity.
- B. Form sills in one piece. Slope sills for wash.
- C. Form snap-in glass stops, closure molds, weather stops, and flashings for tight fit into window frame section.
- D. Form weather stop flange to perimeter of unit.
- E. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- F. Arrange fasteners to be concealed from view.
- G. Permit internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.
- H. Assemble insect screen frame, miter and reinforced frame corners. Fit mesh taut into frame and secure. Fit frame with four spring loaded steel pin retainers.
- I. Double weatherstrip operable units.
- J. Factory glaze window units.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install window units in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

3.02 ADJUSTING

- A. Adjust hardware for smooth operation and secure weather tight closure.

3.03 CLEANING

- A. Remove protective material from pre-finished surfaces.
- B. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.
- C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUBMITTALS

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

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.
- B. Recessed-Mounted Closers: Replace existing closers at the 2-Welcome Center entry doors.
- C. 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.

END OF SECTION 08710

SECTION 08800 - GLAZING

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 PERFORMANCE REQUIREMENTS

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

1.03 SUBMITTALS

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

1.04 WARRANTY

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

2.02 GLASS TYPES

- A. Glass Types - General: Provide glass types fabricated of the glass products indicated.
 - 1. Exterior glass thickness: 6 mm (1/4 inch nominal), unless otherwise indicated.
 - 2. Where safety glazing is required by governing authorities, provide certified safety glazing.
 - 3. Cut or drill holes in laminated units.
- B. Glass Type I - 1: Sealed insulating units at sliding and storefront entry doors and sidelights.
 - 1. Total thickness: 1 inch, nominal.
 - 2. Exterior and Interior pane: **Laminated glass**.
 - a. Two-ply.
 - b. Thickness of plies: 6 mm.
 - c. All plies: **Heat-strengthened float glass**.
 - d. Color: Outer and inner ply: Clear.
 - e. Interlayer thickness: 0.05 inch.
 - f. Shading coefficient: 0.91.
 - g. Winter U-value: 0.52, minimum.
- C. Glass Type SG - 2: Display case Polycarbonate sheet, with mar-resistant coating; thickness: 1/4 inch.
 - 1. Provide certified safety glazing and use at display cases.
 - 2. Color: Clear.

2. Acceptable glazing methods: Sealant, both sides.
- D. Glass Type SG - 3: Obscure glass at Unisex Restroom door; thickness: ¼ inch safety glass.

2.03 BASIC GLASS PRODUCTS

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

DIVISION 9 - FINISHES

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. Glazed wall tiles.
 - 2. Floor paver tiles.

1.02 DESIGN REQUIREMENTS

- A. Fire-Rated Construction: At locations indicated, provide fire-rated assemblies tested per ASTM E 119 and acceptable to governing authorities for designated fire ratings.

1.03 SUBMITTALS

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

1.04 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 the **Dal-Tile Corporation** and/or **American Olean Tile** approved equals (American Olean Tile or Florida Tile). Colors manufactured by a tile company other than that specified, as manufactured by the Dal-Tile Corporation, must be approved as equal in color and texture by the Architect and the Roadside Unit. A manufacture other than Dal-Tile shall submit an actual sample comparison submittal board with their **substitution samples** mounted alongside the specified Dal-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 Facilities Design, NCDOT, 1 S. Wilmington St., Raleigh, NC 27601**, Attn: Vic Buzard, RA.
 - 1. Tile trim and accessories: Match color and finish of adjoining flat tile.

2.02 TILE PRODUCTS

- A. **Floor Tile - Base Bid**; Provide Flat Porcelain Tile with abrasive glazed finish (non-slip):
 - 1. The design is based on the following products:
 - a. Type 1: **Main floor tile** and (sanitary base).
 - 1. Manufacturer: Dal-Tile Corporation.
 - 2. Pattern: **Continental Slate**.
 - 3. Size: 18" x 18" x 3/8", 12" x 12" x 3/8" and (6" x 12" x 5/16" sanitary base).
 - 4. Color: **#CS55, Moroccan Brown** and (sanitary base # **S-36C9T, Moroccan Brown**).
 - b. Type 2: Restroom Floor **Rectangular Accent Pattern**:
 - 1. Manufacturer: Dal-Tile Corporation.
 - 2. Pattern: **Veranda Tones**.
 - 3. Size: 6-1/2" x 20" x 3/8" and 13" x 20" x 3/8".
 - 4. Color: **#P535, Indigo Waters**.
 - c. Type 3: Lobby/Corridor Floor **Compass Accent Pattern "Custom Design Floor Medallion Daltile-Olean File # 9439-NCDOT Panel"**:
 - 1. Manufacturer: Dal-Tile Corporation.
 - 2. Pattern: **Keystones / Timber Glen**.
 - 3. Size: 2" x 2" x 5/16" water-jet-cut North arrow compass design and 12" x 24" x 3/8" Timber Glen, Rustic border tile.
 - 4. Color: **#D023, Galaxy, #D181, Mustard/Dorado, #D617, Arctic White** numbered pattern compass design; and **#P614, Espresso** Timber Glen, Rustic border tile.
- B. **Floor Tile - Alternate No. 1**; Provide Flat Porcelain Tile with abrasive glazed finish (non-slip): Indicate additional cost, if any, from the Base Bid tile above.
 - 1. The design is based on the following products:

- a. Type 1: **Main floor tile** and (sanitary base: AO-St. Germain #536C9T, Chocolate, 6x12).
 1. Manufacturer: Dal-Tile Corporation.
 2. Pattern: **Timber Glen** (wood grain, staggered pattern).
 3. Size: 8" x 24" x 3/8".
 4. Color: **#P614, Espresso, Floor Field**.

C. Wall Tile:

1. The design is based on the following product:
 - a. Type 1: **Restroom and Corridor wall tile, and Restroom Window Trim** (bullnose trim).
 1. Manufacturer: American Olean.
 2. Pattern: **St. Germain**. Size: 12" x 24" x 3/8" Field, 6" x 24" x 3/8" Band, and (3" x 12" x 3/8" bullnose Top Trim).
 3. Color: **#SE61, Creme** at Field walls, **#SE65 & S43C9, Chocolate** at Band and Top Trim at Restroom main walls; **Lavatory Field wall: SE65, Chocolate**, Top Trim 6" x 12" and Window Trim 3" x 12": **SE65, Chocolate**.
 - a) 1" x 1" **Glass tile special accent band pattern sheets" Custom Glass Mosaic Pattern Daltile-Olean File # 9439-NCDOT Design Sheet": #GR16, Honey Bee, #GR14, Statosphere, #GR11, Blue Lagoon, and #GR13, White Ice.**
 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:

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. **Urethane-Based Quartz Grout: By Quartz-Lock Grout, Star Quartz* or 100% Solids Epoxy Grout at all floors and sanitary base;** complying with ANSI A118.3.
 1. Mix in accordance with manufacturer's recommendations.
 2. Colors: **#210, Creme** (wall field), **#285, espresso** (floor & base), and **#560, Sea Blue** (Floor Restroom Accent) by **Quartz-Lock Grout, Star Quartz***
- 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: Comply with ANSI A118.9, Durock Brand Cement Board by USG, Den-Shield by Georgia-Pacific; 1-800-327-2344, James Hardie Cement Backer Board, or approved equal.
 1. Thickness shall equal 5/8"; may be furred to match drywall material above.
- 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: Comply with ANSI A118.9...
- 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. "Custom Design Floor Medallion and Glass Accent Wall Tile" are made to order and require extended lead times. Contractor shall be responsible for appropriate order and delivery time for custom order products.

3.02 TILE APPLICATIONS

- A. Interior Floor, ½" Thin-Bed:
 - 1. Tile: Glazed paver.
 - 2. Installation method:
 - a. Concrete subfloor & Existing Tile Floor: TCA F113 & TR712 (Tile Over Tile).
 - b. Bond coat: Latex-portland cement mortar, ANSI A108.5.
 - c. Joints shall be ¼" wide.
 - 3. Grout: Sand-portland cement.
- B. Interior Wall, ½" 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.
 - 4. Grout: Latex-portland cement.
- C. 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

SECTION 09840 - ACOUSTIC BAFFLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabric-covered fiberglass core ceiling baffles / optional fabric baffles.

1.02 REFERENCE STANDARDS

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2009a.
- B. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2005.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's printed data sheets for products specified.
- B. Shop Drawings: Fabrication and installation details, panel layout, and fabric orientation.
- C. Selection Samples: Manufacturer's color charts for fabric covering, indicating full range of fabrics, colors, and patterns available .

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company with not less than 5 years of experience in manufacturing acoustical products similar to those specified.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect acoustical panels from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until panels are needed for installation.
- B. Store panels flat, in dry, well-ventilated space; do not stand panels on end.
- C. Protect panel edges from damage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustical Panels:
 - 1. Armstrong World Industries, Inc: www.armstrong.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. Essi Acoustical Products Company: www.essiacoustical.com.
 - 4. USG: www.usg.com.
- B. Provide all acoustical panels by one manufacturer.

2.02 ACOUSTICAL BAFFLES

- A. Panels: Prefinished, factory assembled fabric-covered panels.
- B. Fiberglass Core Panels:
 - 1. Density: 7-10 lb/cu ft.
 - 2. Noise Reduction Coefficient (NRC): 0.70-0.80 when tested in accordance with ASTM C423 for Type A mounting, per ASTM E795.
 - 3. Panel Width: 60 inches.
 - 4. Panel Height: 30 inches.
 - 5. Panel Thickness: 1 inch.
 - 6. Edges: Perimeter edges reinforced by an aluminum frame or a formulated resin hardener.
 - 7. Corners: Mitered.
 - 8. Mounting: Suspended from ceiling.
- C. Fabric Covering: Seamless fabric facing material, for stretched covering of core material.
 - 1. Fabric: Woven polyester, fade-resistant.
 - 2. Color: White.

2.03 OPTIONAL FABRIC BAFFLES

- A. Optional Fabric Panels: Submit optional weighted, translucent, prefinished, factory assembled fabric-baffles (without fiberglass panels), double stitched fabric and hemmed; white color fabric with seamed top and bottom stabilization aluminum bars.

2.04 FABRICATION

- A. General: Fabricate panels to sizes and configurations indicated, with fabric facing installed without sagging, wrinkles, blisters, or visible seams.
 - 1. Where radiused or mitered corners are indicated, install fabric to avoid seams or gathering of material.
 - 2. For panels suspended from ceiling, provide fabric covering both sides, with seams only at panel edges.
- B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 in for thickness, overall length and width, and squareness from corner to corner.

2.05 ACCESSORIES

- A. Ceiling-Suspended Accessories: Manufacturer's standard through-threaded eyelets bolted through concealed perimeter frame at 1/4 points on each panel, sized appropriately for weight of panels.
 - 1. Provide aluminum wire or chain for suspension from ceiling at heights indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install acoustical panels in locations indicated, following installation recommendations of panel manufacturer. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.
- B. Suspend ceiling baffles at locations and heights indicated.
- C. Install panels to construction tolerances of plus or minus 1/8 in for the following:
 - 1. Plumb and level.
 - 2. Flatness.

3.02 CLEANING

- A. Clean fabric facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.
- B. Remove surplus materials, trimmed portions of panels, and debris resulting from installation.

3.03 PROTECTION

- A. Provide protection of installed acoustical panels until completion of the work.
- B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

END OF SECTION

SECTION 09900 - PAINTING

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 DEFINITIONS

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

1.03 SUBMITTALS

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

1.04 QUALITY ASSURANCE

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

1.05 DELIVERY, STORAGE, AND HANDLING

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

1.06 PROJECT CONDITIONS

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

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. **The Glidden Company* - Lifemaster.**
- 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. Benjamin Moore & Company - Pristine EcoSpec.
3. Sherwin Williams Company - Health Spec.

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: As shown on drawings and schedules.
- 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 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 & MDF Beadboard Panels: Walls & ceilings.**
 1. Latex acrylic, Eggshell finish.
 - a. Bottom coat: Ultra-Hide 1260 Airless High-Build Flat Interior Primer / Finish; 1.1DFM.
 - b. Intermediate coat: Same as top coat.
 - c. Top coat: Devflex 4212HP High Performance Waterborne Acrylic Eggshell Enamel (color # **50BG 44/094**, “**Wilton Blue**” at Lobby walls& ceilings, color # **35YY 73/372**, “**Jonquil**” at Corridor/Tower walls & ceilings, and #**39YY 77/091**, “**Remain Natural**” at Restroom walls & ceilings and Lobby tall Beadboard panels).
- B. **Wood: Doors & frames, windows, horizontal band/trim, display cabinet, shelving, trusses & plywood ceiling.**
 1. Varnish, satin (stained wood doors).
 - a. Stain: WoodPride 1700 Interior Oil Wood Finishing Stain, (color “**Natural Cedar**”).
 - b. Bottom and intermediate coats: WoodPride 1908 Interior Polyurethane Gloss Varnish.
 - c. Top coat: WoodPride 1902 Interior Polyurethane Satin Varnish.
- C. **Wood: Rope horizontal band applied to the Cedar band at the Lobby.**
 1. Enamel topcoat for primed wood trim.
 - a. Top coat: Rust-Oleum Corp., #**7271830**, “**Silver Metallic**” spray paint.

3.09 SCHEDULE OF COATINGS FOR EXTERIOR NONTRAFFIC SURFACES

- A. **Fiber-Cement: Lap siding & trim at Tower only;**
 1. Acrylic / Latex, flat.
 - a. Bottom coat: Same as top coat.
 - b. Top coat: Ultra-Hide Duras 2210 Exterior Acrylic Flat Finish; 1.5 DFM.
(Siding & trim color shall paint over the fiber-cement ColorPlus “Evening Blue” color with Glidden #**72BB 07/288**, “**Phantom Blue**”.

END OF SECTION 09900

DIVISION 10 - SPECIALTIES

SECTION 10100 - VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Tack boards, see Detail on Sheet A8 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.
- E. 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.

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 shall match Scranton Products, Metallic Gray EX and Grey.
 - b. Sanymetal, color shall match Scranton Products, Metallic Gray EX and Grey.
 - c. **Scranton Products.*: "Linen"** 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 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, including Tactile Characters and Braille.
 - 2. Character Color: Glidden #72BB 07/288, “**Phantom Blue**”.
 - 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>
108	FAMILY ROOM** KNOCK BEFORE ENTRY	1
102	WOMEN *	2
103	MEN *	2
105	Fire extinguisher is located inside Storage room	1
105	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.

- B. Interior Aluminum Individual Letters, at 10” high (vertically on Beadboard panels) shall read:

<u>Location/Room No.</u>	<u>Copy</u>	<u>Quantity</u>
104 (102)	<WOMEN	2
104 (103)	MEN>	2

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 with shelf.
 - 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.
 - 9. Baby Changing Station.

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. Recessed Towel Dispenser and Waste Receptacle: 600 C-fold paper towels, 12 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: "Classic" Model B-3944 manufactured by Bobrick.
- B. Soap Dispenser: Recess mounted, 45 oz. minimum of soaps or lotions capacity, 18 gage stainless steel, soap valve, locking stainless reservoir (key), refill-indicator, conceal hinge, 8-1/2"w x 4-1/8"h x 3-13/16"d.
 - 1. Product: Model B-306 manufactured by Bobrick.
- C. Mirrors (and Shelf): Stainless steel framed, 1/4" 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 24" 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.
- D. Grab Bar 1:
 - 1. Basis of design: B-5806.99 - 42".
 - a. Stainless steel, nonslip gripping surface and concealed mounting, Model B-5806.99, by Bobrick.
- E. Grab Bar 2:
 - 1. Basis of design: B-5806.99 - 36".
 - a. Stainless steel, nonslip gripping surface and concealed mounting, Model B-5806.99, by Bobrick.
- F. Grab Bar 3:
 - 1. Basis of design: B-5806.99 - 18".
 - a. Stainless steel, nonslip gripping surface and concealed mounting, Model B-5806.99, by Bobrick.
- G. 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.
- 2. Basis of design: Model B-386 Bobrick.
 - a. Partition-mounted dual twin hide-a-roll toilet tissue dispenser, holds 2-rolls up to 5-1/4" diameter each side, extra roll drops in place, 1-1/2" projection on each side of the partition.
- H. Partition Mounted Sanitary Napkin Disposal:
 - 1. Basis of design: B-4354 Bobrick.
 - a. Stainless steel.
 - b. Serves 2-compartments.
- I. Semi-Recessed Sanitary Napkin Disposal:
 - 1. Basis of design: B-4353 Bobrick.
 - a. Stainless steel.
 - b. Single end compartments.
- J. 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.
- K. Hand Dryers: (Option-Xlerator XL)
 - 1. Basis of design: Surface mounted sensor hand dryer "AirGuard" Model B-708, by Bobrick.
 - a. Automatic hand dryer, white porcelain finish, 115v, 20 amp, 2300w, 60 Hz.
 - b. Mount 48" above finish floor.
- L. Baby Changing Station with Stainless Steel Veneer: Koala Kare #KB200-SS, injection-molded polypropylene with stainless steel veneer, pneumatic cylinder for opening and closing, concealed stainless steel hinge, for commercial use, built-in liner dispenser, built in instructional graphics with Braille label, and 5-year limited warranty (including vandalism). Two (2) units required, one per each restroom.

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

SECTION 13100 – COMPENSATION FOR GENERAL CONSTRUCTION

SECTION 13100 – COMPENSATION FOR GENERAL CONSTRUCTION

COMPENSATION

The work of furnishing materials and constructing the US-64 Washington County Rest Area Building in accordance with the plans and specifications; completed and accepted, will be paid for at the contract price for "General Construction of Rest Area Service Building." Such price and payment will be full compensation for all work of constructing the US-64 Washington County Rest Area; including but not limited to demolition and furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work.

Payment will be made under:

"General Construction of Rest Area Service Building"Each

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

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 – PRODUCT

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. Shields for Insulated Piping 2½ Inches and Larger: Hard block non-conducting saddles in 90 degree segments, 12 inch minimum length, block thickness same as insulation thickness.
- G. Sheet metal saddles must be ½ the circumference of the insulation, turned up or rounded at the corners to avoid damage to the vapor barrier.

2.2 HANGER RODS

- A. 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

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 vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- K. Support horizontal cast iron pipe adjacent to each hub with 5 feet maximum spacing between hangers.
- L. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- M. Support riser piping independently of connected horizontal piping.
- N. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

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 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. Extend sleeves through floors one (1) inch above finished floor level. Caulk sleeves full depth and provide floor plate.
- D. 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.
- E. Install chrome plated steel or stainless steel escutcheons at finished surfaces.
- F. Pipe strapping will not be allowed.

END OF SECTION 15140

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.
- I. 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.

3.4 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

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.
- D. 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

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

2.2 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.

2.3 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

2.4 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

SECTION 15452 - SOLAR WATER HEATING SYSTEM

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 a pre-packaged solar hot water heating system utilizing a drain back design including a heat exchange tank, collectors, multi-speed pump, mixing valve, check valves, thermal expansion tank and controls as required for a complete operating system.

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. Solar Water Heating Systems:
 - (a) Holocene.
 - (b) Solar Direct.
 - (c) Leveredge.

2.2 Heat Exchange Tanks

- A. Factory assembled and wired, electric, vertical 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.

2.3 Collectors

- A. Flat plate design with integral mounting channel.
- B. Copper absorber plat with black absorber coating.
- C. Stainless steel fasteners.
- D. OG-100 certified by SRCC.

2.4 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. Multi-speed motor.

2.5 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.

PART III - EXECUTION

3.1 SOLAR WATER HEATING SYSTEM INSTALLATION

- A. Provide a complete, packaged system with all components for a proper operation as specified. Install the system in accordance with manufacturer's instructions and to UL requirements.
- B. Provide complete shop drawings outlining the entire system, including all components, piping, pumps and controls.
- C. Coordinate with plumbing piping and related electrical work to achieve operating system.
- D. Securely mount all components to structure.
- E. Provide all controls as required to operate system.
- F. Provide system check out and balancing by factory representatives.
- G. Provide a minimum of (2) two hours of owner training by the factory representatives.

3.2 SOLAR COLLECTOR INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide stainless steel mounting hardware on roof to support unit. Place at optimum angle for each location.
- C. Properly seal all roof/wall penetrations as required for the building type.
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.

3.3 WARRANTY

- A. Provide a minimum of 6 year tank warranty, 10 year collector warranty and 2 year pump and controls warranty.
- B. Provide a complete 1 year labor and materials warranty on the entire system.

END OF SECTION 15452

SECTION 15499 – COMPENSATION FOR PLUMBING

COMPENSATION

The work of furnishing materials and constructing the plumbing installation for the US-64 Washington County Rest Area in accordance with the plumbing and site utility plans and specifications, completed and accepted, will be paid for at the contract price for "Plumbing Installation for Rest Area Service Building". Such price and payment will be full compensation for all work of installing the plumbing service to and for the US-64 Washington County Rest Area, including but not limited to demolition and furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work.

Payment will be made under:

"Plumbing Installation for Rest Area Service Building"Each

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

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

A. 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:

MAXIMUM PIPE SIZE

1/2 to 1-1/4 inch
1-1/2 to 2 inch

HANGER SPACING

6' - 6"
10' - 0"

HANGER DIAMETER

3/8"
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.
- K. Support riser piping independently of connected horizontal piping.
- L. All pipe hangers shall be galvanized steel or copper.
- M. 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

SECTION 15503 – MECHANICAL 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

B. This Section includes Mechanical 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.

B. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.

C. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1½ inch diameter.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape of not less than 6 inches wide by 4 mil thick, manufactured for direct burial service.

PART III - EXECUTION

3.1 PREPARATION

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

B. Prepare surfaces in accordance with manufacturers recommendations.

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 completely around pipe in accordance with manufacturer's instructions.
- D. Underground Plastic Pipe Markers: Install 6 to 8 inches below finished grade, directly above buried pipe.
- E. Equipment: Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with plastic tag.
- F. Controls: Identify control panels and major control components outside panels with plastic nameplates.
- G. Valves: Identify valves in main and branch piping with tags.
- H. 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

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

2.2 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.

2.3 ADHESIVES

A. Flexible Elastomeric Cellular Insulation Adhesive: Solvent-based, contact adhesive recommended by insulation manufacturer.

2.4 SEALING COMPOUNDS

A. 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.

I. 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 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.

3.4 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

<u>PIPE SIZES (NPS)</u>	<u>MATERIALS</u>	<u>THICKNESS IN INCHES</u>
1/2 TO 4	FLEXIBLE ELASTOMERIC	3/4

REFRIGERANT SUCTION

<u>PIPE SIZES (NPS)</u>	<u>MATERIALS</u>	<u>THICKNESS IN INCHES</u>
1/2 TO 1-1/4 ELASTOMERIC	FLEXIBLE	3/4
1-1/2 TO 4 ELASTOMERIC	FLEXIBLE	1

END OF SECTION 15505

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

A. ACCEPTABLE MANUFACTURERS:

1. 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.
- G. 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 15510A - HYDRONIC PIPING

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 Hydronic Piping Systems.

PART II - PRODUCTS

2.1 GROUND LOOP HEAT PUMP PIPING - ABOVE GRADE

A. Steel Pipe: ASTM A53 or A120, Schedule 40, black. Fittings: ANSI/ASTM B16.3, malleable iron or ASTM A234, forged steel. Joints: Screwed for pipe 2 inches and under; ANSI/AWS D1.1 welded for pipe over 2 inches.

B. Copper Tubing: ASTM B88, Type [M,] [L,] [K,] hard drawn. Fittings: ANSI/ASME B16.23 cast brass or ANSI/ASME B16.29 solder wrought copper. Joints: ANSI/AWS A5.8, BCuP silver braze.

2.2 EQUIPMENT DRAINS AND OVERFLOWS

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

2.3 FLANGES, UNIONS AND COUPLINGS

A. Pipe Size 2 Inches and under: 150 psig malleable iron unions for threaded ferrous piping.

B. Pipe Size Over 2 Inches: 150 psig forged steel slip-on flanges for ferrous piping.

2.4 MANUFACTURERS

A. Acceptable Manufacturers:

1. Valves:
 - a. Crane Co.
 - b. Grinnell Co.
 - c. Nibco, Inc.

2.5 GATE VALVES

A. Up to 2 Inches: 150 psig rated, bronze body, bronze trim, rising stem, hand wheel, inside screw, double wedge or disc, threaded ends.

B. Over 2 Inches: 150 psig rated, iron body, bronze trim, rising stem, hand wheel, OS&Y, double wedge, flanged ends.

2.6 GLOBE VALVES

A. Up to 2 Inches: 150 psig rated, bronze body, bronze trim, rising stem and hand wheel, inside screw, renewable composition disc, screwed ends, with back seating capacity re-packable under pressure.

B. Over 2 Inches: 150 psig rated, iron body, bronze trim, rising stem, hand wheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

2.7 BALL VALVES

A. Up to 2 Inches: 150 psig rated, bronze or Stainless steel two- piece body, stainless steel ball, Teflon seats and stuffing box ring, lever handle, and balancing stops, threaded ends.

B. Over 2 Inches: 150 psig rated, cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, or gear drive hand wheel for sizes 10 inches and over, flanged.

2.8 PLUG COCKS

A. Up to 2 Inches: 150 psig rated, bronze body, bronze tapered plug, non-lubricated, Teflon packing, threaded ends, with one wrench operator for every ten plug cocks.

B. Over 2 Inches: 150 psig rated, cast iron body and plug, pressure lubricated, Teflon packing, flanged ends, with wrench operator with set screw.

2.9 SWING CHECK VALVES

A. Up to 2 Inches: 150 psig rated, bronze 45 degree swing disc, screwed ends.

B. Over 2 Inches: 150 psig rated, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.

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.

D. After completion, fill, clean, and treat systems.

3.2 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure and maintain gradient.

B. Install piping to conserve building space, and not interfere with use of space and other work.

C. Group piping whenever practical at common elevations.

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

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

F. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

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

H. Prepare pipe, fittings, supports, and accessories for finish painting.

I. 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 butterfly valves for Shut-Off and to isolate equipment, part of systems, or vertical risers.

D. Install globe or butterfly valves for throttling, bypass, or manual flow control services.

E. Use plug cocks for throttling service. Use non-lubricated plug cocks only when Shut-Off or isolating valves are also provided.

F. Use Butterfly valves interchangeably with gate and globe valves.

G. Provide ¾ inch gate drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest drain.

END OF SECTION 15510A

SECTION 15510B – GROUND-LOOP HEAT-PUMP PIPING

PART I - GENERAL

1.1 SUMMARY

A. This section includes piping for vertical, direct-buried, ground-loop, heat-pump systems that operate between 23 and 104 deg F (minus 5 and plus 40 deg C).

1.2 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:

1. Ground-Loop, Heat-Pump Piping: 200 psig (1380 kPa).

1.3 SUBMITTALS

A. Product Data: For the following:

1. Pipe and fittings.
2. Joining method and equipment.

B. Field quality-control test reports.

PART II – PRODUCTS

2.1 PIPES AND FITTINGS

A. PE Pipe: ASTM D 2239, SDR Numbers 5.3, 7, 9, or 11.5; with PE compound number required to achieve required system working pressure.

1. Molded PE Fittings: ASTM D 2683 or ASTM D 3261, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.

B. U-Bend Assembly: Factory fabricated with embossed depth stamp every 36 inches (900 mm) from U-bend.

2.3 BOREHOLE BACKFILL

A. Surface Seal: Bentonite with thermal conductivity greater than 1.2 Btu/h x sq. ft. x deg F (0.7 W/sq. m x K).

B. Backfill below Surface Seal: Natural or manufactured sand specified in Division 31 Section “Earth Moving”.

PART III - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, warning tape, and backfilling are specified in Division 31 Section “Earth Moving”.

3.2 VERTICAL PIPING INSTALLATION

- A. Install PE piping in boreholes according to ASTM D 2774 or ASTM F 645.
 - 1. Clean PE pipe and fittings and make heat-fusion joints according to ASTM D 2657. Minimize number of joints.
- B. Purge, flush, and pressure test piping before backfilling boreholes.
- C. After installation of loop pipe in borehole, fill piping loop with water or antifreeze solution, and pump backfill into borehole to discharge at base of borehole.
- D. Fill borehole with backfill to a point at least 60 inches (1524 mm) below grade and backfill remainder with surface seal material.
- E. Extend piping and connect to water-source, ground-loop, heat-pump piping systems at outside face of building wall in locations and pipe sizes indicated.
 - 1. Terminate water-service piping at building wall until building water-source, ground-loop, heat-pump piping systems are installed. Terminate piping with caps. Make connections to building water-source, ground-loop, heat-pump piping systems when those systems are installed.
- F. Wall sleeves are specified in Division 15 Section 15050 – Basic Materials and Methods.
- G. Mechanical Sleeve seals are specified in Division 15 Section 15050 – Basic Materials and Methods.
 - 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.

3.3 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.

3.4 FIELD QUALITY CONTROL

- A. Piping Tests: Fill piping 24 hours before testing and apply test pressure to stabilize piping. Use potable water only.
- B. Hydrostatic Tests: Test at not less than 1-1/2 times the pipe working-pressure rating allowing for static pressure of borehole depth.
 - 1. Increase pressure in 50-psig (345-kPa) increments and inspect each joint between increments. Hold at test pressure for 30 minutes. Slowly increase to next test pressure increment and hold for 30 minutes. After testing at maximum test pressure, reduce pressure to 30 psig (207 kPa). Hold for 90 minutes, and measure pressure at 30-minute intervals. Repair leaks and retest until no leaks exist.
 - 2. Prepare reposts of testing activity.

END OF SECTION 15510B

SECTION 15745 – WATER-SOURCE GEOTHERMAL HEAT PUMPS

PART I - GENERAL

1.1 SUMMARY

A. This section includes the following types of water-source heat pumps:

1. Vertical units.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each model.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and maintenance data.

E. Special warranties

1.3 QUALITY ASSURANCE

A. 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.

B. Comply with ASHRAE 15.

C. Comply with minimum COP/efficiency levels according to ASHRAE/IESNA 90.1.

D. Comply with NFPA 70.

E. Comply with safety requirements in UL 484 for assembly of free-delivery water-source heat pumps.

F. Comply with safety requirements in UL1995 for duct-system connections.

G. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which heat pumps will be attached.
3. Method of attaching hangers to building structure.
4. Size and location of initial access modules for acoustical tile.
5. Items penetrating finished ceiling, including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace refrigeration components of water-source heat pumps that fail in materials or workmanship within five years from date of Substantial Completion.

1.5 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Two sets of filters for each unit.

PART II - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 WATER-SOURCE HEAT PUMPS

- A. MANUFACTURERS:
 - 1. Carrier Corporation.
 - 2. ClimateMaster, Inc.
 - 3. FHP Manufacturing, Inc.
 - 4. Trane.
- B. Description: Packaged water-source heat pump with temperature controls; factory assembled, tested, and tated according to ARI-ISO-13256-1.
- C. Cabinet and Chassis: Galvanized-steel casing with the following features:
 - 1. Access panel for access and maintenance of internal components.
 - 2. Knockouts for electrical and piping connections.
 - 3. Flanged duct connections.
 - 4. Cabinet Insulation: Glass-fiber liner, minimum 1/2 inch (13 mm) thick, complying with UL 181.
 - 5. Condensate Drainage: Plastic or stainless-steel drain pan pitched as required in ASHRAE 62 with condensate drain piping projecting through unit cabinet.
 - 6. Sound Attenuation Package:
 - a. Minimum 0.598-inch- (1.5-mm-) thick compressor enclosure an front panel.
Minimum 0.0937-inch- (2.38-mm-) thick foam gasket around the compressor and perimeter of end panel.
 - b. Sound Attenuating blanket over compressor.
 - c. Hot-gas muffler
- D. Fan: Direct driven, centrifugal, with multispeed motor resiliently mounted in fan inlet.
 - 1. General requirements for motors are specified in Division 15 Section "Motors".
 - 2. Motor: Multispeed, permanently lubricated, motor.

E. Water Circuit

1. Refrigerant-to-Water Heat Exchangers: Coaxial heat exchangers with cupronickel water tube with enhanced heat-transfer surfaces inside a steel shell; both shell and tube leak tested to 450 psig (3102 kPa) on refrigerant side and 400 psig (2758 kPa) on the water side. Factory mount heat exchanger in unit on resilient rubber vibration isolators.
2. Motorized Water Valve: Stop water flow through the unit when compressor is off.

F. Refrigerant-to-Air Coils: Copper tubes with aluminum fins, leak tested to 450 psig (3102 kPa).

G. Refrigerant Circuit Components::

1. Sealed Refrigerant Circuit: Change with R-410A refrigerant.
2. Motorized Water Valve: Charging Connections: Service fittings on suction and liquid for charging and testing.
3. Reversing Valve: Pilot-operated sliding-type valve designed to be fail-safe in heating position with replaceable magnetic coil.
4. Compressor: Hermetic reciprocating compressor installed on vibration isolators and housed in an acoustically treated enclosure with factory-installed safeties as follows:
 - a. Antirecycle timer.
 - b. High-pressure cutout.
 - c. Low-pressure cutout or loss of charge switch.
 - d. Internal thermal-overload protection.
 - e. Freezestat to stop compressor if water-loop temperature in refrigerant-to-water heat exchanger falls below 35 deg F (2 deg C).
 - f. Condensate overflow switch to stop compressor with high condensate level in condensate drain pan.
5. Refrigerant Piping Materials: ASTM B 743 copper tube with wrought-copper fittings and brazed joints.
6. Pipe Insulation: Refrigerant minimum 3/8-inch- (10-mm-) thick, flexible elastomeric insulation on piping on piping exposed to airflow through the unit. Maximum 25/50 flame-spread/smoke-development indexes according to ASTM E 84.
7. Refrigerant Metering Device: Thermal expansion valve to allow specified operation with entering-water temperatures from 25 to 125 deg F (minus 4 to plus 52 deg C).
8. Hot-Gas Reheat Valve: Pilot-operated sliding-type valve with replaceable magnetic coil.

H. Hot-Gas Reheat: Reheat valve diverts refrigerant hot gas to reheat coil when remote humidistat calls for dehumidification.

I. Filters: Pleated type, 1 inch (25 mm) thick, with adhesive, shall have minimum 80 percent arrestance according to ASHRAE 52.1 and a minimum efficiency reporting valve (MERV) of 5 according to ASHRAE 52.2

J. Controls:

1. Provide electronic programmable automatic changeover thermostat with remote sensor.

K. Electrical Connection: Single electrical connection with fused disconnect.

2.3 HOSE KITS

- A. General: Hose kits shall be designed for minimum 400 psig (2758 kPa) working pressure, and operating temperatures from 33 to 211 deg F (.05 to 99 deg C). Tag hose kits to equipment

designations.

- B. Hose: Minimum diameter, equal to water-source heat-pump connection size. Length as required.
- C. Isolation Valves: Two-piece bronze-body ball valves with stainless-steel ball and stem and galvanized-steel lever handle. Provide valve for supply and return. If balancing device is combination shutoff type with memory stop, the isolation valve may be omitted on the return.
- D. Strainer: Y-type with blowdown valve in supply connection.
- E. Balancing Devices: Mount in return connection. Include meter ports to allow flow measurement with differential pressure gage.
 - 1. Manual, calibrated-orifice balancing valve.
- F. See Drawing Detail for additional requirements.

PART III - EXECUTION

3.1 INSTALLATION

- A. Concrete Bases: Install floor mounting units on 4-inch- (100-mm-) high concrete bases. See Division 15 Section "Basic Mechanical Materials and Methods" for concrete base materials and fabrication requirements.
- B. Mount water-source heat pumps on concrete base with vibration isolators.
 - 1. Units with Internally Isolated Fans and Compressors: Support on concrete bases using neoprene pads with minimum 0.125-inch (3.17-mm) static deflection. Secure units to anchor bolts installed in concrete bases.
 - 2. Floor-Mounted Units: Support on concrete bases using housed-spring isolators. Secure units to anchor bolts installed in concrete bases.
- C. Install wall-mounting thermostats, humidistats, and switch controls in electrical outlet boxes at heights as directed by the Owner.
- D. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows.
 - 1. Connect supply and return hydronic piping to heat pump as shown on Drawings.
 - 2. Connect heat-pump condensate drain pan to indirect waste connection with condensate trap of adequate depth to seal against the pressure of fan. Install cleanouts in piping at changes of direction. Provide overflow drain pan consistent with Mechanical Code.
- E. Duct installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of ducts. Specific connection requirements are as follows:
 - 1. Connect supply and return ducts to water-source heat pumps with flexible duct connectors.
- F. Install electrical devices furnished by manufacturer but not specified to be factory mounted.
- G. Install piping adjacent to machine to allow service and maintenance.
- H. Ground equipment according to Division 16 Section "Grounding and Bonding".
- I. Connect wiring according to Division 16 Section "Conductors and Cables".

3.2 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing water-source heat pumps and after electrical circuitry has been energized, test units for compliance with requirements.
 - 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace malfunctioning units and retest as specified above.

3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
- B. Complete installation and startup checks according to manufacturer's written instructions and do the following:
 - 1. Inspect for visible damage to unit casing.
 - 2. Inspect for visible damage to compressor, coils, and fans.
 - 3. Inspect internal insulation.
 - 4. Verify that labels are clearly visible.
 - 5. Verify that clearances have been provided for servicing.
 - 6. Verify that controls are connected and operable.
 - 7. Verify that filters are installed.
 - 8. Adjust vibration isolators.
 - 9. Inspect operation of barometric dampers.
 - 10. Verify bearing lubrication on fan.
 - 11. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
 - 12. Adjust fan belts to proper alignment and tension.
 - 13. Start unit according to manufacturer's written instructions.
 - 14. Complete startup sheets and attach copy with Contractor's startup report.
 - 15. Inspect and record performance of interlocks and protective devices; verify sequences.
 - 16. Operate unit for an initial period as recommended or required by manufacturer.
 - 17. Verify thermostat and humidistat calibration.
 - 18. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
 - 19. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
 - 20. Start refrigeration system and measure and record the following:
 - a. Coil leaving-air, dry- and wet-bulb temperatures.
 - b. Coil entering-air, dry- and wet-bulb temperatures.
 - c. Outdoor-air, dry-bulb temperature.
 - d. Outdoor-air-coil, discharge-air, dry-bulb temperature.
 - 21. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.
 - a. Supply-air volume.
 - b. Return-air volume.
 - c. Relief-air volume.
 - d. Outdoor-air intake volume.

3.4 ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

3.5 CLEANING

- A. Replace filters used during construction prior to air balance or substantial completion.
- B. After completing installation of exposed, factory-finished water-source heat pumps, inspect exposed finishes and repair damaged finishes.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water-source heat pumps. Refer to Division 1 Section "Demonstration and Training".

END OF SECTION 15745

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

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

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:

Diameter (inches)	Thickness (inches)
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:

<u>Fitting Body Diameters</u> (inches)	<u>Minimum Round Fitting</u> Thickness (inches)
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.

3.2 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

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

2.1 AIR TURNING DEVICES

A. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

2.2 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.

2.3 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

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

SECTION 15999 – COMPENSATION FOR MECHANICAL

COMPENSATION

The work of furnishing and installing Heating and Air Conditioning in the US-64 Washington County Rest Area in accordance with the HVAC and Site Utility plans and specifications, completed and accepted, will be paid for at the contract price for "Heating & Air Conditioning Installation for Rest Area Service Building. " Such price and payment will be full compensation for all work of constructing the HVAC system for the US-64 Washington County Rest Area, including but not limited to demolition and furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work.

Payment will be made under:

"Heating & Air Conditioning Installation for Rest Area Service Building"Each

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 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 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 "PROJECT CLOSEOUT". In addition to the requirements specified in Division 1, include the following information for equipment items:
 - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 - 2. Manufacturer's printed Operating Procedures to include start-up, break-in, and routine and normal Operating Instructions; regulation, control, stopping, shutdown, and emergency instructions and summer and winter operating instructions.
 - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and re-assembly; aligning and adjusting instructions.
 - 4. Servicing Instructions and Lubrication Charts and Schedules.

3.12 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements in Division 1 Section "PROJECT CLOSEOUT". In addition to the requirements specified in Division 1, indicate installed conditions for:
 - 1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.

2. Equipment locations (exposed and concealed) dimensioned from prominent building lines.
3. Approved substitutions, Contract modifications and actual equipment and materials installed.

3.13 GUARANTEE

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

3.14 FINAL INSPECTION

- A. When the entire Contract has been completed and the work is ready for final inspection, the Architect/Engineer or his duly authorized representative will make the inspection. At the time of inspection, the Electrical Contractor shall demonstrate to the Architect/Engineer that the various systems and pieces of equipment have been adjusted to operate in accordance with the requirements of the Contract.
- B. An authorized Inspector from the North Carolina Department of Insurance shall inspect the project during construction and upon completion of the construction phase. It shall be the responsibility of the Electrical Contractor to notify the Inspector as the work progresses. The NCDOI Inspector can be reached at (919) 661-5880.

3.15 FINAL PAYMENTS

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

3.16 DOCUMENTATION

- A. All tests shall be completely documented indicated time of day, temperature, and all pertinent test information.
- B. All required documentation of readings shall be submitted to the engineer prior to, and as one of the prerequisites for, final acceptance of the project.

END OF SECTION 16010

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.
- Z. Provide grounding connections for raceway, boxes and components. Tighten connectors and terminals according to tightening torques specified in UL Standard 486A.
- AA. 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.
- BB. 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.
- CC. 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.

- DD. 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.
- EE. 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 meter. 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 meter 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 meter 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 meter 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

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.
 - 1. 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

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

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, panel boards, 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:

<u>230/120 Volts</u>	<u>Phase</u>
Black	A
Red	B
White	Neutral
Green	Ground

- F. 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".
- G. 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.
- H. 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.
- I. 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 panel boards and alarm/signal components, where labeling is specified elsewhere. For panel boards, 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.
- J. 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.
- K. 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

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.
- B. 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 ¾ 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 torqueing 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

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 reflectance 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

SECTION 16999 – COMPENSATION FOR ELECTRICAL

COMPENSATION

The work of furnishing and installing electrical work in the US-64 Washington County Rest Area in accordance with the Electrical and Site Utility plans and specifications, completed and accepted, will be paid for at the contract price for "Electrical Installation for Rest Area Service Building." Such price and payment will be full compensation for all work of performing the electrical installation to and for the US-64 Washington County Rest Area, including but not limited to demolition and furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work.

Payment will be made under:

"Electrical Installation for Rest Area Service Building"Each

SITE DEMOLITION

General

Site demolition consists of the removal and disposal of all pavement, structures, site amenities and vegetative material designated to be removed as indicated on the plans and as directed by the Engineer. Vegetative material includes trees and shrubs with stumps, and plant beds as designated on the plans and as directed by the Engineer on site. Others will remove selected structures, site amenities and any trees or shrubs to be salvaged prior to the construction. Benches, recycle bins, and trash receptacles noted on plans or as directed by the engineer, are to be removed by contractor, salvaged and stockpiled (on site) for reuse by NCDOT. **Demolition for the purpose of rest area building renovations is covered elsewhere in the Special Provisions.**

All methods and operations used for removal of paving, structures, site amenities and vegetative material will meet prior approval of the Engineer. Make a saw cut providing a clean edge at locations where concrete paving is removed.

Satisfactorily complete vegetative removal operations prior to building and landscape grading operations. Vegetation removal consists of below ground removal of root masses as well as above ground growth. Perform all work so as to cause minimum soil erosion and comply with the requirements of Section 107- 13. Conduct vegetation removal operations in a manner to prevent limb, bark or root injuries to trees, shrubs, or other types of vegetation that are to remain. Should damage occur to adjacent trees or shrubs to remain take all steps necessary as directed by the Engineer to repair or minimize the effects of the damage to the tree or shrub. Remove any tree or shrub that is to remain that is damaged to the extent that its value as a desirable landscape tree is compromised in the opinion of the engineer. There will be no further compensation for removal of a tree or shrub damaged by the contractor. Furthermore, the contractor will reimburse the owner for the aesthetic value of the tree or shrub, as determined by a certified arborist using the current International Society of Arboriculture plant appraisal standards.

All materials removed that are not noted for recycling or reinstallation on the project will become the property of the Contractor and will be properly disposed of by the Contractor off site.

Prevent damage to adjacent property and structures during the removal and demolition operations. The contractor is responsible for repairing any and all damaged areas to its original condition and/or to the satisfaction of the Engineer.

Compensation

Payment for the work of removing and disposing of all paving, structures, site amenities and vegetation as described above, indicated on plans and directed by the Engineer, will be paid for as a 'Lump Sum' for 'Site Demolition'.

Such price and payment will be full compensation for all work covered by this provision; including but not limited to furnishing all labor, tools and equipment and any other incidentals necessary or required to complete the work.

Payment will be made under:

Site Demolition **Lump Sum**

TREE PRESERVATION / PROTECTION FENCE

General Requirements and Restrictions

The aesthetics and comfort of the rest area is greatly enhanced by the maturing trees on the site. The Department has dedicated much effort to preserve all the existing trees possible during this renovation project. This will require the utmost care during the construction process since the construction is located very close to many of the trees we desire to preserve. The contractor will assist the department by educating its employees, subcontractors and any utility companies conducting work in the vicinity, of the efforts and the preservation measures required herein.

Tree Preservation/Protection Fence consist of furnishing, installing, maintaining, and removing wood slat, polyethylene, or polypropylene fence as specified or as directed by the Engineer and in accordance with the special provisions included herein.

Install tree protection fence prior to any demolition. All construction unless approved by the Engineer will occur within the construction fence. *Do not trespass* with vehicles or machinery in the areas indicated for tree preservation. Do not park, refuel, repair or maintain vehicles or equipment in the tree preservation areas. Do not stockpile materials or store equipment in the tree preservation areas.

Do not release petroleum products, fuels, paints, or lubricants anywhere within this project in the vicinity of the tree preservation areas or in areas that drain into this vicinity. Do not apply or release herbicides, fertilizers or chemicals of any kind that may be toxic to plant life and do not 'clean out' concrete trucks in the vicinity of the tree preservation areas, or into areas that drain into this vicinity. Do not burn trash, debris or vegetation in the vicinity of tree preservation areas.

Demolition, ground disturbing activities and construction that occurs within the drip line of the tree(s) or within a radius three times the drip line of the tree(s) will be done with utmost care. Accomplish all grading in such a manner as to avoid standing water or saturated soils around root systems of trees that are to remain. Install erosion control devices in a timely manner to prevent sedimentation of the tree root zone in the tree preservation areas. In areas to be 'cut' by grading or where utility trenches or building footings occur, prevent shredding, tearing or exposing roots by excavating a trench not less than 6" wide and to the maximum depth of the cut up to 24" deep. Hand saw any roots 2" or greater in diameter that are encountered to make a clean smooth cut. If necessary, dig out enough soil to reach an undamaged portion of the root to make the smooth cut. To prevent drying out of roots, immediately cover any exposed root surfaces with 6" of approved mulch or soil until 'finish' construction operations dictate removal. Supplemental irrigation may be necessary during periods of drought or stress. Irrigate as directed and approved by the Engineer.

Branches that protrude into the construction area that interfere with construction operations will be tied back if possible or pruned if not. Follow proper pruning techniques as established in American National Standards Institute ANSI Z133.1 and perform pruning by a professional arborist. Submit description of proposed work along with arborist credentials to the Engineer for approval prior to conducting work.

Violation of any of these tree preservation measures will result in suspension of all work until the violation is resolved or repaired to the satisfaction of the Engineer. Such suspension of work will not be considered justification for additional compensation in accordance with Section 104 of the Standard Specifications or extension of the contract time.

Materials

Posts will be nominal 2" x 4" or 4" x 4", lengths as required, structural light framing, grade no. 2, southern yellow pine or steel posts will be a minimum of 1 3/8" wide measured parallel to the fence, with a weight of 1.25 lbs/ft of length. Wood posts will be treated with a preservative in accordance with Section 1082-3 of the Standard Specifications.

Fence fabric will be a barricade or safety barrier type highly visible orange polyethylene or polypropylene mesh that is approved by the Engineer. Fabric will be UV stabilized, flexible and inert to most chemicals and acid.

Signs will be fabricated of a durable, weatherproof lightweight material. Signs will have a white background with red lettering. They will be a minimum of 4.5 square feet and clearly display the following message in both English and Spanish:

TREE PROTECTION ZONE**DO NOT ENTER**

Submit sample for approval prior to placing.

Installation

Erect fence to conform to the general contour of the ground. Do not remove existing plant material in order to install fence unless directed by the Engineer.

Set post and maintain in a vertical position. Post may be hand set or set with a post driver. If hand set, thoroughly tamp all backfill material, if power driven, wood posts may be sharpened to a dull point. Remove and replace any post damaged by power driving prior to final acceptance. Cut the tops of all posts at a 30-degree angle. The posts may, at the option of the Contractor, be cut at this angle either before or after the posts are erected. Contractor is responsible for locating all utilities prior to installation of fence posts.

Stretch fence fabric taut and attach to post with appropriate means according to post type utilized. In sections where signs will be located, reinforce top of fabric by weaving a 12 gauge galvanized wire in the fabric and firmly attach to the post at each end of section. Place signs every 100 linear feet with a minimum of one sign for each segment facing in a different direction. Secure sign to fence fabric at all four corners placing near the top of the fence fabric where clearly visible.

Tree Protection Fence Maintenance

At any time during the duration of the project if the tree protection fence is not in an upright secure position with no gaps and properly signed, work on the project will be suspended wholly until the fence is properly repaired and determined to be in satisfactory condition by the Engineer. Remove tree protection fence, fill post holes, weed/mow and dispose of debris off site as a last item of work on the project.

Compensation

Tree Protection / Preservation Fence will be paid for as 'Tree Protection Fence' in linear feet as measured along the surface of the installed and accepted work.

Such payment will be full compensation for the work described above including furnishing, installing, and removing; fence post, fence bracing, fence fabric, staples, tie wires; all tools, equipment and any other incidentals necessary to complete the work. Mulch and/or watering required herein will be incidental to the completion of the work.

Payment will be made under.

Tree Protection Fence LF

4” CONCRETE SIDEWALKS

General: The sidewalks indicated on the plans shall be 4" concrete. The sidewalks, curb ramps, 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. This quantity of concrete includes all noted 4” sidewalk and the concrete banding associated with installation of decorative concrete pavers. The quantity of sidewalk measured as indicated above, will be paid for at the contract unit price per square yard for "4" Concrete Sidewalk". Concrete Curb Ramps will be paid for at the contract unit price per each. There will be no additional compensation for control and expansion joints.

Payment will be made under:

4" Concrete Sidewalk SY
Concrete Curb RampEA

LANDSCAPE AND SITE GRADING

General

Landscape and Site grading consists of surface grading and placing topsoil material within seeding and planting beds, and cutting and backfilling around buildings, sidewalks, etc., to provide proper drainage and elevations as indicated on the grading plans, cross-sections, and as directed by the Engineer.

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.**

Fill material to bring building site to finished grade will be as specified in the building specifications under earthwork.

Installation

Place building fill and compact as described in the building specifications. Place topsoil fill and spread evenly to a depth of 18 inches or 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 fill material under 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:

Landscape and Site Grading	LS
Topsoil	CY

SITE STORMWATER DRAINAGE

Applicable parts of the supplementary General Conditions and the Standard Specifications govern work under this division which includes all labor, materials, equipment and services necessary for the proper completion of storm drainage and related work indicated on the drawings or in the specifications in general as follows:

- Landscape Drainage Drop Inlets, Catch Basins, and Junction Boxes
- Storm Drainage Pipe
- Storm drainage system from building downspouts to catch basin as shown on grading
- Adapters at each building downspout
- Cleanouts in drain lines

General

The work covered by this provision consists of excavation, fabrication, furnishing, installing drop inlets, junction box and drainage pipe, and making proper connections to the existing storm water drainage system as shown on the plans and as directed by the Engineer.

Masonry Drainage Structures

Materials

Masonry drainage structures will be as specified in Section 840 of the Standard Specifications. Concrete Drop Inlet will be as shown in Roadway Standard Drawing 840.14 with grate as shown in 840.16 at locations as indicated on the plans.

Installation

Exact placement of structures will be optimized in the field to align with existing drainage structures and necessary connections. Invert elevations will be determined/adjusted in the field based on existing drainage structures.

Downspout Connections

Downspout Conversion Unit

Building downspout to drain pipe adapter will consist of metal downspout conversion unit to adapt from rectangular downspout to drain pipe as shown on drawings. These conversion units will be incidental to drain pipe installation and there will be no separate compensation

Cleanouts

Cleanouts will be proper shape, length, and degree of bend, to fit conditions. Cleanouts will be set at locations shown on the plans but not more than 50 feet apart. Cleanout plugs will be minimum of 4", with finish elevation at proposed finish grades for lawn, plant bed or sidewalk. Cleanouts in sidewalks will be brass stem and cap mounted flush with sidewalk.

Storm Drainage Pipe

Materials

Storm drainage pipe will be corrugated plastic pipe (CPP) meeting requirements of ASTM as noted below. Specified CPP 4-10" shall be singled walled corrugated pipe (unless otherwise noted on plans). Specified CPP 12" and greater shall be double walled with smooth/corrugated exterior pipe. All fittings, adapters, and connection shall be installed according to applicable ASTM, NCDOT, and manufacturers specifications.

For General Construction	For Highway Construction
Single Wall (3"-6") CPP ASTM-F-405-"C" (8"-24") CPP ASTM-F-667-"C"	Single Wall (3"-10") CPP AASHTO-M- 252- "C" (12"-60") CPP AASHTO-M-294-"C"
Smooth Core (3"-6") CPP ASTM-F-2306-"S" (12"-60") CPP ASTM-F-2306-"S"	Smooth Core (3"-10") CPP AASHTO-M-252-"C" (12"-60") CPP AASHTO-M-294-"C"

Installation

- a) Excavate trench to a sufficient width to receive pipe and allow for tamping equipment and to the depth established by the Engineer. Follow precautions under 'Tree Preservation' if working in the vicinity of trees to be preserved.
- b) Join pipe sections and fittings together in accordance with manufacturer's recommendations.
- c) Where the pipe foundation material is found to be of poor supporting value or of rock the foundation will be conditioned by removing the existing foundation material. Remove existing foundation material by undercutting one foot or to a depth as directed by the Engineer, and backfill with either a suitable local material or a foundation condition material. Foundation condition material consists of crushed stone or gravel or a combination of sand and crushed stone and will be approved by the Engineer as being suitable for the purpose intended. The selection of the type of backfill to be used for foundation conditioning will be made by the Engineer.
- d) Connect to existing or proposed drainage structures as indicated on the plans and as directed by the Engineer.
- e) Backfill material will be carefully placed so that the pipe will not be disturbed after it has been laid. Firmly tamp the Engineer approved earth backfill material in 6 inch layers to a density equal to that of the surrounding undisturbed soil.
- f) Maintain all drainage installations in a continuously functioning condition from the time the pipe is installed until the project is accepted.

Compensation

Site Stormwater Drainage system shall include all labor, equipment and all incidental services and materials necessary for the proper completion of storm drainage as indicated on the drawings and/or specifications.

Payment will be made under:

Site Stormwater Drainage Lump Sum

9" CONCRETE BORDER - CLASS B CONCRETE

General: The work covered by this item shall consist of furnishing and constructing 9" wide concrete border in coordination with the installation of the permeable pavers and accordance with the dimensions as shown in the drawings and as described herein.

The 9" concrete border construction shall conform to all applicable requirements of Section 848 (Sidewalks and Driveways) of the Standard Specifications.

Method of Measurement

The quantity of 9" concrete border to be paid for shall be the actual number of square yards of 9" concrete border, measured complete in place and accepted.

Basis of Payment

The quantity measures as provided above, shall be paid for at the contract unit price per square yard for "9" Concrete Border " complete in place and accepted, which price and payment shall be full compensation for furnishing and installing, and for all labor, equipment, tools and incidentals necessary to complete the work.

Payment will be made under:

9" Concrete Border SY

PERMEABLE INTERLOCKING CONCRETE PAVERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Permeable interlocking concrete pavers.
2. Crushed stone bedding material.
3. Open-graded base aggregate.
4. Bedding and joint/opening filler materials.
5. Edge restraints.
6. Geotextiles.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. C 67, Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
2. C 131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
3. C 136, Method for Sieve Analysis for Fine and Coarse Aggregate.
4. C 140, Test Methods for Sampling and Testing Brick and Structural Clay Tile, Section 8 – Freezing and Thawing.
5. D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
6. C 936, Standard Specification for Solid Interlocking Concrete Pavers.
7. C 979, Specification for Pigments for Integrally Colored Concrete.
8. D 698, Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5-lb (2.49 kg) Rammer and 12 in. (305 mm) drop.
9. D 1557, Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb (4.54 kg) Rammer and 18 in. (457 mm) drop.
10. D 1883, Test Method for California Bearing Ratio of Laboratory-Compacted Soils.
11. D 4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

B. Interlocking Concrete Pavement Institute (ICPI)

1. Permeable Interlocking Concrete Pavement manual.

1.03 SUBMITTALS

A. Permeable concrete pavers:

1. Manufacturer's product catalog sheets with specifications.

1.04 QUALITY ASSURANCE

A. Paver Installation Subcontractor Qualifications:

1. Utilize an installer having successfully completed concrete paver installation similar in design, material and extent indicated on this project.

B. Mock-Ups:

1. Install a 10 ft x 10 ft (3 x 3 m) paver area.
2. Use this area to determine surcharge of the bedding layer, joint sizes, lines, laying pattern, color, and texture of the job.
3. This area will be used as the standard by which the work will be judged.
4. Subject to acceptance by owner, mock-up may be retained as part of finished work.
5. If mock-up is not retained, remove and properly dispose of mock-up.

1.05 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with Section 106, Control of Material.

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 container packaging with identification tags intact on each paver bundle.

1. Coordinate delivery and paving schedule to minimize interference with normal use of buildings adjacent to paving.
2. Deliver concrete pavers to the site in steel banded, plastic banded, or plastic wrapped cubes capable of transfer by forklift or clamp lift.
3. Unload pavers at job site in such a manner that no damage occurs to the product or existing construction

D Storage and Protection: Store materials in protected area such that they are kept free from mud, dirt, and other foreign materials.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not install in rain or snow.

B. Do not install frozen bedding materials.

1.07 MAINTENANCE

- A. Extra materials: Provide 20 SF additional material for use by owner for maintenance and repair.
- B. Pavers shall be from the same production run as installed materials.

PART 2 PRODUCTS

2.01 PAVERS

- A. Manufacturer: Belgard, Hanover, Hanson or equivalent.
- B. Permeable Interlocking Concrete Paver Units:
 - 1. Paver Type: ADA Compliant.
 - a. Material Standard: Comply with ASTM C 936.
 - b. Color: Gray/Tan Blend.
 - c. Color Pigment Material Standard: Comply with ASTM C 979.
 - d. Size: 3 inches minimum thickness x modular units, size per product line.

2.02 PRODUCT SUBSTITUTIONS

- A. Contractor may submit for approval, samples of equivalent ADA compliant permeable interlocking concrete paver products by established manufacturers, in a similar pattern and color.

2.03 CRUSHED STONE FILLER, BEDDING AND BASE

- A. Crushed stone with 90% fractured faces, LA Abrasion < 40 per ASTM C 131, minimum CBR of 80% per ASTM D 1883.
- B. Do not use rounded river gravel.
- C. All stone materials shall be washed with less than 1% passing the No. 200 sieve.
- D. Joint/opening filler, bedding and base: conforming to ASTM D 448 gradation as shown in Tables 1, and 2 below:

Note: No. 89 or finer gradation may be used to fill permeable pavers with narrow joints.

Table 1

ASTM No. 8 Bedding and Joint/Opening Filler Grading Requirements

Sieve Size Percent Passing

12.5 mm (1/2 in.) 100

9.5 mm (3/8 in.) 85 to 100

4.75 mm (No. 4) 10 to 30

2.36 mm (No. 8) 0 to 10

1.16 mm (No. 16) 0 to 5

Table 2

ASTM No. 57 Open Base Grading Requirements

Sieve Size Percent Passing

37.5 mm (1 1/2 in.) 100

25 mm (1 in.) 95 to 100

12.5 mm (1/2 in.) 25 to 60

4.75 mm (No. 4) 0 to 10

2.36 mm (No. 8) 0 to 5

E. Gradation criteria for the bedding and base:

Note: D_x is the particle size at which x percent of the particles are finer. For example, D_{15} is the particle size of the aggregate for which 15% of the particles are smaller and 85% are larger.

1. D_{15} base stone / D_{50} bedding stone < 5 .

2. D_{50} base stone / D_{50} bedding stone > 2 .

2.04 ACCESSORIES

A. Provide accessory materials as follows:

Note: Curbs will be cast-in-place concrete.

1. Geotextile Fabric: Type 1 per Section 1056.

PART 3 EXECUTION

3.01 ACCEPTABLE INSTALLERS

A. Utilize an installer having successfully completed concrete paver installation similar in design, material and extent indicated on this project.

3.02 EXAMINATION

Note: The elevations and surface tolerance of the soil subgrade determine the final surface elevations of concrete pavers. The paver installation contractor cannot correct deficiencies excavation and grading of the soil subgrade with additional bedding materials.

A. Acceptance of Site Verification of Conditions:

1. General Contractor shall inspect, accept and certify in writing to the paver installation subcontractor that site conditions meet specifications for the following items prior to installation of interlocking concrete pavers.

- a. Verify that subgrade preparation, compacted density and elevations conform to specified requirements.
- b. Provide written density test results for soil subgrade to the Owner, General Contractor and paver installation subcontractor.
- c. Verify location, type, and elevations of edge restraints, utility structures, and drainage pipes and inlets.

2. Do not proceed with installation of bedding and interlocking concrete pavers until subgrade soil conditions are corrected by the General Contractor or designated subcontractor.

3.03 PREPARATION

- A. Verify that the soil subgrade is free from standing water.
- B. Stockpile joint/opening filler, base and subbase materials such that they are free from standing water, uniformly graded, free of any organic material or sediment, debris, and ready for placement.
- C. Edge Restraint Preparation:
 1. Install concrete border per the drawings at the indicated elevations.

3.04 INSTALLATION

Note: No mud or sediment can be left on the base or bedding aggregates. If they are contaminated, they must be removed and replaced with clean materials.

A. General

1. Any excess thickness of soil applied over the excavated soil subgrade to trap sediment from adjacent construction activities shall be removed before application of the subbase materials.
2. Keep area where pavement is to be constructed free from sediment during entire job. Geotextiles, base and bedding materials contaminated with sediment shall be removed and replaced with clean materials.

B. Geotextiles

1. Place on bottom and sides of soil subgrade. Secure in place to prevent wrinkling.
2. Overlap a minimum of 12 in. (0.3 m) in the direction of drainage.

C. Open-graded base

1. Moisten, spread and compact No. 57 base in 4 in. (100 mm) lifts with a minimum 10 T (10 t) vibratory roller until there is no visible movement of the No. 57 stone. Do not crush aggregate with the roller.
2. The surface tolerance the compacted No. 57 base should not deviate more than ± 1 in. (25 mm) over a 10 ft (3 m) straightedge.

Note: In-place density of the base and subbase may be checked per ASTM D 4254. Compacted density should be 95% of the laboratory index density established for the subbase and base stone.

D. Geotextiles

1. Place on top of graded base.
2. Overlap a minimum of 12 in. (0.3m) in the direction of drainage.

E. Bedding layer

1. Moisten, spread and screed the No. 8 stone bedding material.
2. Fill voids left by removed screed rails with No. 8 stone.
3. The surface tolerance of the screeded No. 8 bedding layer shall be $\pm 3/8$ in (10 mm) over a 10 ft (3 m) straightedge.
4. Do not subject screeded bedding material to any pedestrian or vehicular traffic before paving unit installation begins.

F. Permeable interlocking concrete pavers and joint/opening fill material

1. Lay the pavers in the pattern shown on the drawings. Maintain straight pattern lines.
2. Fill gaps at the edges of the paved area with cut units. Cut pavers subject to tire traffic shall be no smaller than 1/3 of a whole unit.
3. Cut pavers with a double-bladed splitter or masonry saw and place along the edges.
4. Fill the openings and joints with No. 8 stone.

Note: Some paver joint widths may be narrow and not accept most of the No. 8 stone. Use joint material that will fill joints such as washed ASTM No. 9 or No. 10 stone. These smaller stone sizes are recommended for filling joints in pedestrian applications that use 2 3/8 in. (60 mm) thick pavers.

5. Remove excess aggregate on the surface by sweeping pavers clean.
6. Compact and seat the pavers into the bedding material using a low-amplitude, 75-90 Hz plate compactor capable of at least 4,000 lbs (18 kN) centrifugal compaction force. This will require at least two passes with the plate compactor.
7. Do not compact within 6 ft (2 m) of the unrestrained edges of the paving units.
8. Apply additional aggregate to the openings and joints, filling them completely. Remove excess aggregate by sweeping then compact the pavers. This will require at least two passes with the plate compactor.
9. All pavers within 6 ft (2 m) of the laying face must be left fully compacted at the completion of each day.
10. The final surface tolerance of compacted pavers shall not deviate more than $\pm 3/8$ (10 mm) under a 10 ft (3 m) long straightedge.
11. The surface elevation of pavers shall be 1/8 to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

3.05 FIELD QUALITY CONTROL

- A. After sweeping the surface clean, check final elevations for conformance to the drawings.
- B. Lippage: No greater than 1/8 in. (3 mm) difference in height between adjacent pavers.

Note: The minimum slope of the finished pavement surface should be 1%. The surface of the pavers may be 1/8 to 1/4 in. (3 to 6 mm.) above the final elevations after compaction. This helps compensate for possible minor settling normal to pavements.

- C. The surface elevation of pavers shall be 1/8 to 1/4 in. (3 to 6 mm) above adjacent drainage inlets, concrete collars or channels.

3.06 PROTECTION

- A. After work in this section is complete, the General Contractor shall be responsible for protecting work from sediment deposition and damage due to subsequent construction activity on the site.

Method of Measurement and Basis of Payment

The work of furnishing and installing Permeable Interlocking Concrete Pavers as shown on the plans or as approved by the Engineer, when completed and accepted, will be paid for at the unit price per square feet for "Permeable Interlocking Concrete Pavers". Such price and payment will be full compensation for all work covered by this special provision; including but not limited to furnishing transport, all labor, materials, equipment, excavation and grading, and any other incidentals necessary to complete the work.

Payment will be made under:

Permeable Interlocking Concrete PaversSF

BENCH WITH BRICK BASE

General: The work covered by this item shall consist of furnishing and installing combination wood and brick masonry benches as shown on the plans and described herein.

Masonry construction for bench base shall conform to all applicable requirements of section 830 of the Standard Specifications, pertaining to "Masonry Construction - General".

Brick shall be the same as specified for the building in this project. All wood in bench seat assembly shall be Douglas Fir of "C" or better grade and sized as shown on the plans.

Stain all wood with two coats of latex stain prior to assembling bench and one finish coat after bench has been installed. Color to match other wood structures on site as approved by the Engineer.

All bolts, screws, washers, and channel shall be galvanized and conform to all applicable requirements of Section 1076 of the Standard Specifications. Touch-up all breaks in galvanizing, such as holes, end cuts, etc. with zinc rich paint prior to assembling bench.

Method of Measurements and Basis of Payment

Benches as described above and as shown on the plans shall be paid for at the contract unit price each for "Bench with Brick Base", complete in place and accepted. Such price shall be full compensation for all labor, materials, tools, equipment, and all other incidentals necessary to complete the work.

Payment will be made under:

Bench with Brick Base EA

RELOCATION OF DIRECT BURIAL POST TOP LIGHTS AND RELOCATION OF OUTDOOR PAY PHONE ON CONCRETE PAD

General

Relocate existing Post Top Light and existing exterior Payphone/Booth as shown on the plans and as directed by the Engineer. Relocation will include, but not be limited to, dismantling the light and pole or phone and pedestal booth, removing the existing concrete pad, storing items during construction, constructing concrete pad for Phone Booth with subbed –up conduit and anchor bolts, reinstallation of the light and direct burial pole or phone and booth pedestal and connecting to existing/new Lighting circuit. Phone shall be reconnected to relocated phone line and electrical source in location as shown on the drawings or as directed by the Engineer.

NOTE: Underground Electric/Phone Lines damaged during construction must be in working order before the project will be finally accepted.

3” –PVC Utility Sleeve-- shall be installed where shown on the plans or when requested by the Engineer in locations where proposed utility lines will cross under proposed sidewalks or other structures.

Relocation of post top light and pole and relocation of payphone and pedestal on 4” – concrete pad will be paid for at the contract unit price each successfully relocated, installed, and accepted

Such price and payment will be full compensation for all work covered by this special provision; including but not limited to furnishing all labor, materials, equipment and any other incidentals necessary or required to complete the work and restore service.

Payment will be made under:

Relocate Post Top Light and Pole.EA
Relocate Payphone and PedestalEA
3”- PVC Utility Sleeve.....LF

LISTING OF DBE SUBCONTRACTORS

Sheet _____ of _____

Firm Name and Address	Item No.	Item Description	* Agreed upon Unit Price	** Dollar Volume of Item
Name Address				
Name Address				
Name Address				
Name Address				
Name Address				

* The Dollar Volume shown in this column shall be the Actual Price Agreed Upon by the Prime Contractor and the DBE subcontractor, and these prices will be used to determine the percentage of the DBE participation in the contract.

** Dollar Volume of DBE Subcontractor \$ _____
Percentage of Total Contract Bid Price _____ %

** - Must have entry even if figure to be entered is zero.

** - *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.*

**This form must be completed in order for the Bid to be considered responsive and be publicly read.
Bidders with no DBE participation must so indicate this on the form by entering the word or number *zero***

**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

_____ Full Name of Partnership

_____ Address as Prequalified

_____ By _____
Signature of Witness Signature of Partner

_____ Print or type Signer's name

_____ Print or type Signer's name

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the _____ day of _____ 20__.

NOTARY SEAL

_____ Signature of Notary Public

of _____ County

State of _____

My Commission Expires: _____

**EXECUTION OF BID
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION**

LIMITED LIABILITY COMPANY

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF CONTRACTOR

_____ Full Name of Firm

_____ Address as Prequalified

_____ Signature of Witness

_____ Signature of Member/Manager/Authorized Agent
Select appropriate title

_____ Print or type Signer's name

_____ Print or type Signer's Name

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the _____ day of _____ 20__.

NOTARY SEAL

_____ Signature of Notary Public

of _____ County

State of _____

My Commission Expires: _____

EXECUTION OF BID
NON-COLLUSION AFFIDAVIT, DEBARMENT CERTIFICATION AND GIFT BAN CERTIFICATION
JOINT VENTURE (2) or (3)

The person executing the bid, on behalf of the Bidder, being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee of the bidder has entered into any agreement, participated in any collusion, or otherwise taken any action which is in restraint of free competitive bidding in connection with any bid or contract, that the bidder has not been convicted of violating N.C.G.S. § 133-24 within the last three years, and that the Bidder intends to do the work with its own bonafide employees or subcontractors and is not bidding for the benefit of another contractor.

In addition, execution of this bid in the proper manner also constitutes the Bidder's certification of status under penalty of perjury under the laws of the United States in accordance with the Debarment Certification attached, provided that the Debarment Certification also includes any required statements concerning exceptions that are applicable.

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

SIGNATURE OF CONTRACTOR

Instructions: **2 Joint Venturers** Fill in lines (1), (2) and (3) and execute. **3 Joint Venturers** Fill in lines (1), (2), (3) and (4) and execute. On Line (1), fill in the name of the Joint Venture Company. On Line (2), fill in the name of one of the joint venturers and execute below in the appropriate manner. On Line (3), print or type the name of the other joint venturer and execute below in the appropriate manner. On Line (4), fill in the name of the third joint venturer, if applicable and execute below in the appropriate manner.

(1) _____
Name of Joint Venture

(2) _____
Name of Contractor

Address as Prequalified

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 and

(3) _____
Name of Contractor

Address as Prequalified

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 and

(4) _____
Name of Contractor (for 3 Joint Venture only)

Address as Prequalified

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

Address as Prequalified

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 _____ 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

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.

Contract No: DA00148

Counties: WASHINGTON

ACCEPTED BY THE
DEPARTMENT OF TRANSPORTATION

Contract Officer

Date

WASHINGTON COUNTY US-64 REST AREA RENOVATION

The undersigned, as bidder, proposes and agrees if this proposal is accepted to contract with the State of North Carolina through the North Carolina Department of Transportation for the furnishing of all materials, equipment, and labor necessary to complete the construction of the work described in these documents in full and complete accordance with plans, specifications, and contract documents, and to the full and entire satisfaction of the North Carolina Department of Transportation for the total sum of:

Single Prime Contract:

Line No.	Item No.	Sect. No.	Description	Quantity	Unit	Unit Price	Amount Bid
1	2591000000-E	SP	4" Concrete Sidewalk	400	SY		
2	2605000000-N	SP	Concrete Curb Ramp	3	EA		
3	2761000000-E	SP	Generic Paving Item (9" Concrete Border)	18	SY		
4	6012000000-E	1610	Sediment Control Stone	1.5	TON		
5	6042000000-E	1632	¼" Hardware Cloth	24	LF		
6	6147000000-E	SP	Generic Erosion Control Item (Tree Protection Fence)	100	LF		
7	6900000000-E	SP	Topsoil	50	CY		
8	6950000000-N	SP	General Construction of Rest Area Service Building	1	EA		
9	6955000000-N	SP	Plumbing Installation for Rest Area Service Building	1	EA		
10	6960000000-N	SP	Electrical Installation for Rest Area Service Building	1	EA		
11	6965000000-N	SP	Heating & Air Conditioning Installation for Rest Area Service Building	1	EA		
12	6970000000-N	SP	Generic Rest Area Item (Bench with Brick Base)	8	EA		
13	6970000000-N	SP	Generic Rest Area Item (Relocate Payphone and Pedestal)	1	EA		
14	6970000000-N	SP	Generic Rest Area Item (Relocate Post Top Light and Pole)	1	EA		
15	6975000000-N	SP	Generic Rest Area Item (Landscape and Site Grading)	1	LS		
16	6975000000-N	SP	Generic Rest Area Item (Site Demolition)	1	LS		
17	6975000000-N	SP	Generic Rest Area Item (Site Storm Water Drainage)	1	LS		
18	6980000000-E	SP	Generic Rest Area Item (3" PVC Utility Sleeve)	90	LF		
19	6982000000-E	SP	Generic Rest Area Item (Permeable Interlocking Concrete Pavers)	1,210	SF		

TOTAL BASE BID: _____ **Dollars\$** _____

Alternate No.1: Wood Grain Floor Tile, Timber Glen 8x24 floor tile and 6x12 sanitary base; in lieu of the Base Bid Continental Slate 18x18, 12x12 floor tile, and 6x12 sanitary base.

Dollars \$ _____

Unit Price No. 1: Well Depth amount written below shall be the amount to be "added to" or "deducted from" the base bid Geothermal Well Depth (above or below the allowance) of 1,000 (4-250' wells) Lin. Ft. well depth specified.

Dollars \$ _____ **/Lin. Ft.**

General Contractor	License No
Plumbing Subcontractor	License No
HVAC Subcontractor	License No
Electrical Subcontractor	License No

The Bidder further proposes and agrees hereby to commence work under this contract on a date to be specified in a written order of the Designer and shall fully complete all work thereunder within **240 consecutive calendar days** from and including said date. Applicable liquidated damages shall be as stated in Supplementary General Conditions.

Respectively submitted this **20th** day of **March 2013**.

(Name of firm or corporation making bid)

WITNESS: _____ **BY:** _____

(Proprietorship or Partnership) _____
(TITLE: (Owner, Partner, Pres. or V.P.))

Address: _____

ATTEST: _____ **LICENSE NO.:** _____

BY: _____ (Corporate Seal)

TITLE: _____
(Corp. Sec. / Ass't. Sec.)

ACCEPTED:
State of North Carolina through the North Carolina Department of Transportation

BY: _____ **TITLE:** Division Project Manager
W. B. Hobbs, PE

DATE: _____

Addendum No. 1, dated _____ Addendum No. 2, dated _____

Addendum No. 3, dated _____ Addendum No. 4, dated _____