STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH, N.C.

C203202

CONTRACT AND
CONTRACT BONDS

FOR CONTRACT NO. C203202

WBS	41534.3.FS1 NHS-0023(18)
T.I.P NO.	K-5002
COUNTY OF	HAYWOOD
THIS IS THE	REST AREA CONTRACT
ROUTE NUMBER	US 23 LENGTH 0.265 MILES
LOCATION	US-23/74 SOUTHBOUND REST AREA ON NEW LOCATION AND RENOVATE EXISTING NORTHBOUND REST AREA.
CONTRACTOR	BUCHANAN AND SONS INC
ADDRESS	P.O. BOX 123 WHITTIER, NC 28789
BIDS OPENED	MARCH 18, 2014
CONTRACT EXECUTION	APR 28 2014

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH, N.C.

PROPOSAL

DATE AND TIME OF BID OPENING: **MARCH 18, 2014 AT 2:00 PM**

CONTRACT ID	C203202
WBS	41534.3.FS1

FEDERAL-AID NO.	NHS-0023(18)
COUNTY	HAYWOOD
T.I.P. NO.	K-5002
MILES	0.265
ROUTE NO.	US 23
LOCATION	US-23/74 SOUTHBOUND REST AREA ON NEW LOCATION AND RENOVATE EXISTING NORTHBOUND REST AREA.
TYPE OF WORK	REST AREA.

NOTICE:

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

BIDS WILL BE RECEIVED AS SHOWN BELOW:

THIS IS A <u>REST AREA</u> PROPOSAL

5% BID BOND OR BID DEPOSIT REQUIRED

_____

PROPOSAL FOR THE CONSTRUCTION OF

CONTRACT No. C203202 IN HAYWOOD COUNTY, NORTH CAROLINA

Date_____ 20_____

DEPARTMENT OF TRANSPORTATION,

RALEIGH, NORTH CAROLINA

The Bidder has carefully examined the location of the proposed work to be known as Contract No. **C203202**; has carefully examined the plans and specifications, which are acknowledged to be part of the proposal, the special provisions, the proposal, the form of contract, and the forms of contract payment bond and contract performance bond; and thoroughly understands the stipulations, requirements and provisions. The undersigned bidder agrees to bound upon his execution of the bid and subsequent award to him by the Board of Transportation in accordance with this proposal to provide the necessary contract payment bond and contract performance bond within fourteen days after the written notice of award is received by him. The undersigned Bidder further agrees to provide all necessary machinery, tools, labor, and other means of construction; and to do all the work and to furnish all materials, except as otherwise noted, necessary to perform and complete the said contract in accordance with *the 2012 Standard Specifications for Roads and Structures* by the dates(s) specified in the Project Special Provisions and in accordance with the requirements of the Engineer, and at the unit or lump sum prices, as the case may be, for the various items given on the sheets contained herein.

The Bidder shall provide and furnish all the materials, machinery, implements, appliances and tools, and perform the work and required labor to construct and complete State Highway Contract No. **C203202** in **Haywood County**, for the unit or lump sum prices, as the case may be, bid by the Bidder in his bid and according to the proposal, plans, and specifications prepared by said Department, which proposal, plans, and specifications show the details covering this project, and hereby become a part of this contract.

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

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

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

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

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

NORTH CAROLINA PROFESSIONAL SEAL 21076 ENGINEER RANDY A. GARRIS

2/12/14

State Contract Officer

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PROJECT SPECIAL PROVISIONS

GENERAL

CONTRACT TIME AND LIQUIDATED DAMAGES:

(8-15-00) (Rev. 12-18-07) 108 SP1 G07 A

The date of availability for this contract is **April 28, 2014**, except that work in jurisdictional waters and wetlands shall not begin until a meeting between the DOT, Regulatory Agencies, and the Contractor is held as stipulated in the permits contained elsewhere in this proposal. This delay in availability has been considered in determining the contract time for this project.

The completion date for this contract is **May 30, 2016**.

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

The liquidated damages for this contract are **Two Hundred Dollars ($200.00)** per calendar day. These liquidated damages will not be cumulative with any liquidated damages which may become chargeable under Intermediate Contract Time Number 1.

INTERMEDIATE CONTRACT TIME NUMBER 1 AND LIQUIDATED DAMAGES:

(7-1-95) (Rev. 2-21-12) 108 SP1 G13 A

Except for that work required under the Project Special Provisions entitled *Planting, Reforestation* and/or *Permanent Vegetation Establishment*, included elsewhere in this proposal, the Contractor will be required to complete all work included in this contract and shall place and maintain traffic on same.

The date of availability for this intermediate contract time is **April 28, 2014**.

The completion date for this intermediate contract time is **December 1, 2015**.

The liquidated damages for this intermediate contract time are **One Thousand Five Hundred Dollars ($1,500.00)** per calendar day.

Upon apparent completion of all the work required to be completed by this intermediate date, a final inspection will be held in accordance with Article 105-17 and upon acceptance, the Department will assume responsibility for the maintenance of all work except *Planting, Reforestation* and/or *Permanent Vegetation Establishment*. The Contractor will be responsible for and shall make corrections of all damages to the completed roadway caused by his planting operations, whether occurring prior to or after placing traffic through the project.

INTERMEDIATE CONTRACT TIME NUMBER 2 AND LIQUIDATED DAMAGES

(2-20-07) SP1 G14 A

The Contractor shall complete the required work of installing, maintaining, and removing the traffic control devices for lane closures and restoring traffic to a two-lane, one-way traffic pattern. The Contractor shall not close or narrow a lane of traffic on **US 23/74** during the following time restrictions:

DAY AND TIME RESTRICTIONS

Monday thru Friday from 7:00 a.m. to 9:00 a.m.
and
Monday thru Friday from 4:00 p.m. to 6:00 p.m.

In addition, the Contractor shall not close or narrow a lane of traffic on **US 23/74**, detain and/or alter the traffic flow on or during holidays, holiday weekends, special events, or any other time when traffic is unusually heavy, including the following schedules:

HOLIDAY AND HOLIDAY WEEKEND LANE CLOSURE RESTRICTIONS

1. For **unexpected occurrence** that creates unusually high traffic volumes, as directed by the Engineer.

2. For **New Year's Day**, between the hours of 7:00 a.m. December 31st and 6:00 p.m. January 2nd. If New Year's Day is on a Friday, Saturday, Sunday or Monday, then until 6:00 p.m. the following Tuesday.

3. For **Easter**, between the hours of 7:00 a.m. Thursday and 6:00 p.m. Monday.

4. For **Memorial Day**, between the hours of 7:00 a.m. Friday and 6:00 p.m. Tuesday.

5. For **Independence Day**, between the hours of 7:00 a.m. the day before Independence Day and 6:00 p.m. the day after Independence Day.

   If **Independence Day** is on a Friday, Saturday, Sunday or Monday, then between the hours of 7:00 a.m. the Thursday before Independence Day and 6:00 p.m. the Tuesday after Independence Day.

6. For **Labor Day**, between the hours of 7:00 a.m. Friday and 6:00 p.m. Tuesday.

7. For **Thanksgiving Day**, between the hours of 7:00 a.m. Tuesday and 6:00 p.m. Monday.

8. For **Christmas**, between the hours of 7:00 a.m. the Friday before the week of Christmas Day and 6:00 p.m. the following Tuesday after the week of Christmas Day.

9. For **Leaf Season,** the entire month of October and 1st week in November, between 7:00 a.m. Friday to 6:00 p.m. Monday.

Holidays and holiday weekends shall include New Year's, Easter, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas. The Contractor shall schedule his work so that lane closures will not be required during these periods, unless otherwise directed by the Engineer.

The time of availability for this intermediate contract work shall be the time the Contractor begins to install all traffic control devices for lane closures according to the time restrictions listed herein.

The completion time for this intermediate contract work shall be the time the Contractor is required to complete the removal of all traffic control devices for lane closures according to the time restrictions stated above and place traffic in a two-lane, one-way pattern.

The liquidated damages are **Five Hundred Dollars ($500.00)** per hour.

PERMANENT VEGETATION ESTABLISHMENT:

(2-16-12) (Rev. 10-15-13) 104 SP1 G16

Establish a permanent stand of the vegetation mixture shown in the contract. During the period between initial vegetation planting and final project acceptance, perform all work necessary to establish permanent vegetation on all erodible areas within the project limits, as well as, in borrow and waste pits. This work shall include erosion control device maintenance and installation, repair seeding and mulching, supplemental seeding and mulching, mowing, and fertilizer topdressing, as directed. All work shall be performed in accordance with the applicable section of the *2012 Standard Specifications*. All work required for initial vegetation planting shall be performed as a part of the work necessary for the completion and acceptance of the Intermediate Contract Time (ICT). Between the time of ICT and Final Project acceptance, or otherwise referred to as the vegetation establishment period, the Department will be responsible for preparing the required National Pollutant Discharge Elimination System (NPDES) inspection records.

Once the Engineer has determined that the permanent vegetation establishment requirement has been achieved at an 80% vegetation density (the amount of established vegetation per given area to stabilize the soil) and no erodible areas exist within the project limits, the Contractor will be notified to remove the remaining erosion control devices that are no longer needed. The Contractor will be responsible for, and shall correct any areas disturbed by operations performed in permanent vegetation establishment and the removal of temporary erosion control measures, whether occurring prior to or after placing traffic on the project.

Payment for *Response for Erosion Control, Seeding and Mulching, Repair Seeding, Supplemental Seeding, Mowing, Fertilizer Topdressing, Silt Excavation,* and *Stone for Erosion Control* will be made at contract unit prices for the affected items. Work required that is not represented by contract line items will be paid in accordance with Articles 104-7 or 104-3 of the *2012 Standard Specifications*. No additional compensation will be made for maintenance and removal of temporary erosion control items.

CONSTRUCTION MORATORIUM

SPI 1-15

No in-water work or land disturbance within the 25 ft wide buffer zone will be allowed from **October 15** through **April 15** of any year.

MAJOR CONTRACT ITEMS:

(2-19-02) 104 SP1 G28

The following listed items are the major contract items for this contract (see Article 104-5 of the *2012 Standard Specifications*):

Line #	Description
4	Unclassified Excavation
30	Asphalt Concrete Base Course, Type B25.0B
125	3" Force Main Sewer

SPECIALTY ITEMS:

(7-1-95)(Rev. 1-17-12) 108-6 SP1 G37

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

Line #	Description
60 thru 65	Guardrail
66 thru 68	Fencing
71 thru 80	Signing
90 thru 92, 95 thru 96	Long-Life Pavement Markings
97	Permanent Pavement Markers
98 thru 112	Lighting
113 thru 141	Utility Construction
142 thru 168, 170	Erosion Control
169	Reforestation
171 thru 186	Planting
187 thru 219	Rest Area

FUEL PRICE ADJUSTMENT:

(11-15-05) (Rev. 2-18-14) 109-8 SP1 G43

Revise the *2012 Standard Specifications* as follows:

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

The base index price for DIESEL #2 FUEL is **$ 3.1476** per gallon. Where any of the following are included as pay items in the contract, they will be eligible for fuel price adjustment.

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

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

SCHEDULE OF ESTIMATED COMPLETION PROGRESS:

(7-15-08) (Rev. 5-21-13) 108-2 SP1 G58

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

Fiscal Year		Progress (% of Dollar Value)
2014	(7/01/13 - 6/30/14)	16% of Total Amount Bid
2015	(7/01/14 - 6/30/15)	69% of Total Amount Bid
2016	(7/01/15- 6/30/16)	15% of Total Amount Bid

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

DISADVANTAGED BUSINESS ENTERPRISE:

(10-16-07)(Rev. 12-17-13) 102-15(J) SP1 G61

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.
http://connect.ncdot.gov/projects/construction/Construction%20Forms/DBE%20MBE%20WBE%20Replacement%20Request%20Form.pdf

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

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

Letter of Intent - Form signed by the Contractor and the 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://connect.ncdot.gov/letting/LetCentral/Letter%20of%20Intent%20to%20Perform%20as%20a%20Subcontractor.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://connect.ncdot.gov/municipalities/Bid%20Proposals%20for%20LGA%20Content/08%20DBE%20Subcontractors%20(Federal).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://connect.ncdot.gov/business/SmallBusiness/Documents/DBE%20Subcontractor%20Quote%20Comparison%20Example.xls

DBE Goal

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

Disadvantaged Business Enterprises **10.0** %

(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:

(A) Electronic Bids

Bidders shall submit a listing of DBE participation in the appropriate section of Expedite, the bidding software of Bid Express®.

(1) Submit the names and addresses of DBE firms identified to participate in the contract. If the bidder uses the updated listing of DBE firms shown in Expedite, the bidder may use the dropdown menu to access the name and address of the DBE firm.

(2) Submit the contract line numbers of work to be performed by each DBE firm. When no figures or firms are entered, the bidder will be considered to have no DBE participation.

(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) Paper Bids

(1) *If the DBE goal is more than zero,*

(a) 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.

(b) 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. **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.

(c) 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 corresponding goal.

(2) *If the DBE goal is zero,* entries on the *Listing of DBE Subcontractors* are not required for the zero goal, however any DBE participation that is achieved during the project shall be reported in accordance with requirements contained elsewhere in the special provision.

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 and 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 State Contractor Utilization Engineer or at DBE@ncdot.gov no later than 12:00 noon of the sixth calendar day following opening of bids, unless the sixth day falls on an official state holiday. In that situation, it is due in the office of the State Contractor Utilization 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 State Contractor Utilization Engineer or DBE@ncdot.gov no later than 12:00 noon on the eighth calendar day following opening of bids, unless the eighth day falls on an official state holiday. In that situation, it is due in the office of the State Contractor Utilization 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.

A hard copy and an electronic copy of this information shall be received in the office of the State Contractor Utilization Engineer or at DBE@ncdot.gov no later than 12:00 noon of the sixth calendar day following opening of bids unless the sixth day falls on an official state holiday. In that situation, it is due in the office of the State Contractor Utilization Engineer the next official state business day. If the contractor cannot send the information electronically, then one complete set and 9 copies of this information shall be received under the same time constraints above.

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, written notices, use of verifiable electronic means 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.

(1) Where appropriate, break 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.

(2) Negotiate with subcontractors to assume part of the responsibility to meet the contract DBE goal when the work to be sublet includes potential for DBE participation (2nd and 3rd tier subcontractors).

(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 State Contractor Utilization 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 State Contractual Services Engineer or at DBE@ncdot.gov. 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 <u>not</u> 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 DOT 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.

(A) Electronic Bids Reporting

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

(B) Paper Bids Reporting

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.

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.

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).

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.

SUBSURFACE INFORMATION:
(7-1-95) 450 SP1 G112 B

Subsurface information is available on the roadway portion of this project only.

LOCATING EXISTING UNDERGROUND UTILITIES:
(3-20-12) 105 SP1 G115

Revise the *2012 Standard Specifications* as follows:

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

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

RESOURCE CONSERVATION:
(5-21-13) 104-13 SP1 G118

In accordance with North Carolina Executive Order 156, NCGS 130A-309.14(2), and NCGS 136-28.8, it is the policy of the Department to aid in the reduction of materials that become a part of our solid waste stream, to divert materials from landfills, and to find ways to recycle and reuse materials for the benefit of the Citizens of North Carolina.

Initiate, develop and use products and construction methods that incorporate the use of recycled or solid waste products in accordance with Article 104-13 of the *2012 Standard Specifications*. Report the quantities of reused or recycled materials either incorporated in the project or diverted from landfills on the Project Construction Reuse and Recycling Reporting Form.

A location-based tool for finding local recycling facilities and the Project Construction Reuse and Recycling Reporting Form are available at:

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

DOMESTIC STEEL:
(4-16-13) 106 SP1 G120

Revise the *2012 Standard Specifications* as follows:

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

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

MAINTENANCE OF THE PROJECT:
(11-20-07) (Rev. 1-17-12) 104-10 SP1 G125

Revise the *2012 Standard Specifications* as follows:

Page 1-35, Article 104-10 Maintenance of the Project, line 25, add the following after the first sentence of the first paragraph:

All guardrail/guiderail within the project limits shall be included in this maintenance.

Page 1-35, Article 104-10 Maintenance of the Project, line 30, add the following as the last sentence of the first paragraph:

The Contractor shall perform weekly inspections of guardrail and guiderail and shall report damages to the Engineer on the same day of the weekly inspection. *Where damaged guardrail or guiderail is repaired or replaced as a result of maintaining the project in* accordance with this article, such repair or replacement shall be performed within 7 consecutive calendar days of such inspection report.

Page 1-35, Article 104-10 Maintenance of the Project, lines 42-44, replace the last sentence of the last paragraph with the following:

The Contractor will not be directly compensated for any maintenance operations necessary, except for maintenance of guardrail/guiderail, as this work will be considered incidental to the work covered by the various contract items. The provisions of Article 104-7, Extra Work, and Article 104-8, Compensation and Record Keeping will apply to authorized maintenance of guardrail/guiderail. Performance of weekly inspections of guardrail/guiderail, and the damage reports required as described above, will be considered to be an incidental part of the work being paid for by the various contract items.

TWELVE MONTH GUARANTEE:

(7-15-03) 108 SP1 G145

(A) The Contractor shall guarantee materials and workmanship against latent and patent defects arising from faulty materials, faulty workmanship or negligence for a period of twelve months following the date of final acceptance of the work for maintenance and shall replace such defective materials and workmanship without cost to the Department. The Contractor will not be responsible for damage due to faulty design, normal wear and tear, for negligence on the part of the Department, and/or for use in excess of the design.

(B) Where items of equipment or material carry a manufacturer's guarantee for any period in excess of twelve months, then the manufacturer's guarantee shall apply for that particular piece of equipment or material. The Department's first remedy shall be through the manufacturer although the Contractor is responsible for invoking the warranted repair work with the manufacturer. The Contractor's responsibility shall be limited to the term of the manufacturer's guarantee. NCDOT would be afforded the same warranty as provided by the Manufacturer.

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

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

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

GIFTS FROM VENDORS AND CONTRACTORS:

(12-15-09) 107-1 SP1 G152

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

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

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

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

EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION:

(1-16-07) (Rev 9-18-12) 105-16, 225-2, 16 SP1 G180

General

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

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

(A) *Certified Supervisor* - Provide a certified Erosion and Sediment Control/Stormwater Supervisor to manage the Contractor and subcontractor operations, insure compliance with Federal, State and Local ordinances and regulations, and manage the Quality Control Program.

(B) *Certified Foreman* - Provide a certified, trained foreman for each construction operation that increases the potential for soil erosion or the possible sedimentation and turbidity of surface waters.

(C) *Certified Installer* - Provide a certified installer to install or direct the installation for erosion or sediment/stormwater control practices.

(D) *Certified Designer* - Provide a certified designer for the design of the erosion and sediment control/stormwater component of reclamation plans and, if applicable, for the design of the project erosion and sediment control/stormwater plan.

Roles and Responsibilities

(A) *Certified Erosion and Sediment Control/Stormwater Supervisor* - The Certified Supervisor shall be Level II and responsible for ensuring the erosion and sediment control/stormwater plan is adequately implemented and maintained on the project and for conducting the quality control program. The Certified Supervisor shall be on the project within 24 hours notice from initial exposure of an erodible surface to the project's final acceptance. Perform the following duties:

(1) Manage Operations - Coordinate and schedule the work of subcontractors so that erosion and sediment control/stormwater measures are fully executed for each operation and in a timely manner over the duration of the contract.

(a) Oversee the work of subcontractors so that appropriate erosion and sediment control/stormwater preventive measures are conformed to at each stage of the work.

(b) Prepare the required National Pollutant Discharge Elimination System (NPDES) Inspection Record and submit to the Engineer.

(c) Attend all weekly or monthly construction meetings to discuss the findings of the NPDES inspection and other related issues.

(d) Implement the erosion and sediment control/stormwater site plans requested.

(e) Provide any needed erosion and sediment control/stormwater practices for the Contractor's temporary work not shown on the plans, such as, but not limited to work platforms, temporary construction, pumping operations, plant and storage yards, and cofferdams.

(f) Acquire applicable permits and comply with requirements for borrow pits, dewatering, and any temporary work conducted by the Contractor in jurisdictional areas.

(g) Conduct all erosion and sediment control/stormwater work in a timely and workmanlike manner.

(h) Fully perform and install erosion and sediment control/stormwater work prior to any suspension of the work.

(i) Coordinate with Department, Federal, State and Local Regulatory agencies on resolution of erosion and sediment control/stormwater issues due to the Contractor's operations.

(j) Ensure that proper cleanup occurs from vehicle tracking on paved surfaces or any location where sediment leaves the Right-of-Way.

(k) Have available a set of erosion and sediment control/stormwater plans that are initialed and include the installation date of Best Management Practices. These practices shall include temporary and permanent groundcover and be properly updated to reflect necessary plan and field changes for use and review by Department personnel as well as regulatory agencies.

(2) Requirements set forth under the NPDES Permit - The Department's NPDES Stormwater permit (NCS000250) outlines certain objectives and management measures pertaining to construction activities. The permit references *NCG010000, General Permit to Discharge Stormwater* under the NPDES, and states that the Department shall incorporate the applicable requirements into its delegated Erosion and Sediment Control Program for construction activities disturbing one or more acres of land. The Department further incorporates these requirements on all contracted bridge and culvert work at jurisdictional waters, regardless of size. Some of the requirements are, but are not limited to:

(a) Control project site waste to prevent contamination of surface or ground waters of the state, i.e. from equipment operation/maintenance, construction materials, concrete washout, chemicals, litter, fuels, lubricants, coolants, hydraulic fluids, any other petroleum products, and sanitary waste.

(b) Inspect erosion and sediment control/stormwater devices and stormwater discharge outfalls at least once every 7 calendar days, twice weekly for construction related *Federal Clean Water Act, Section 303(d)* impaired streams with turbidity violations, and within 24 hours after a significant rainfall event of 0.5 inch that occurs within a 24 hour period.

(c) Maintain an onsite rain gauge or use the Department's Multi-Sensor Precipitation Estimate website to maintain a daily record of rainfall amounts and dates.

(d) Maintain erosion and sediment control/stormwater inspection records for review by Department and Regulatory personnel upon request.

(e) Implement approved reclamation plans on all borrow pits, waste sites and staging areas.

(f) Maintain a log of turbidity test results as outlined in the Department's Procedure for Monitoring Borrow Pit Discharge.

(g) Provide secondary containment for bulk storage of liquid materials.

(h) Provide training for employees concerning general erosion and sediment control/stormwater awareness, the Department's NPDES Stormwater Permit NCS000250 requirements, and the applicable requirements of the *General Permit, NCG010000.*

(i) Report violations of the NPDES permit to the Engineer immediately who will notify the Division of Water Quality Regional Office within 24 hours of becoming aware of the violation.

(3) Quality Control Program - Maintain a quality control program to control erosion, prevent sedimentation and follow provisions/conditions of permits. The quality control program shall:

(a) Follow permit requirements related to the Contractor and subcontractors' construction activities.

(b) Ensure that all operators and subcontractors on site have the proper erosion and sediment control/stormwater certification.

(c) Notify the Engineer when the required certified erosion and sediment control/stormwater personnel are not available on the job site when needed.
(d) Conduct the inspections required by the NPDES permit.
(e) Take corrective actions in the proper timeframe as required by the NPDES permit for problem areas identified during the NPDES inspections.
(f) Incorporate erosion control into the work in a timely manner and stabilize disturbed areas with mulch/seed or vegetative cover on a section-by-section basis.
(g) Use flocculants approved by state regulatory authorities where appropriate and where required for turbidity and sedimentation reduction.
(h) Ensure proper installation and maintenance of temporary erosion and sediment control devices.
(i) Remove temporary erosion or sediment control devices when they are no longer necessary as agreed upon by the Engineer.
(j) The Contractor's quality control and inspection procedures shall be subject to review by the Engineer. Maintain NPDES inspection records and make records available at all times for verification by the Engineer.

(B) *Certified Foreman* - At least one Certified Foreman shall be onsite for each type of work listed herein during the respective construction activities to control erosion, prevent sedimentation and follow permit provisions:

(1) Foreman in charge of grading activities
(2) Foreman in charge of bridge or culvert construction over jurisdictional areas
(3) Foreman in charge of utility activities

The Contractor may request to use the same person as the Level II Supervisor and Level II Foreman. This person shall be onsite whenever construction activities as described above are taking place. This request shall be approved by the Engineer prior to work beginning.

The Contractor may request to name a single Level II Foreman to oversee multiple construction activities on small bridge or culvert replacement projects. This request shall be approved by the Engineer prior to work beginning.

(C) *Certified Installers* - Provide at least one onsite, Level I Certified Installer for each of the following erosion and sediment control/stormwater crew:

(1) Seeding and Mulching
(2) Temporary Seeding
(3) Temporary Mulching
(4) Sodding
(5) Silt fence or other perimeter erosion/sediment control device installations
(6) Erosion control blanket installation
(7) Hydraulic tackifier installation

(8) Turbidity curtain installation
(9) Rock ditch check/sediment dam installation
(10) Ditch liner/matting installation
(11) Inlet protection
(12) Riprap placement
(13) Stormwater BMP installations (such as but not limited to level spreaders, retention/detention devices)
(14) Pipe installations within jurisdictional areas

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

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

Preconstruction Meeting

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

Ethical Responsibility

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

Revocation or Suspension of Certification

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

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

(A) Failure to adequately perform the duties as defined within this certification provision.
(B) Issuance of an ICA, NOV, or Cease and Desist Order.
(C) Failure to fully perform environmental commitments as detailed within the permit conditions and specifications.
(D) Demonstration of erroneous documentation or reporting techniques.

(E) Cheating or copying another candidate's work on an examination.
(F) Intentional falsification of records.
(G) Directing a subordinate under direct or indirect supervision to perform any of the above actions.
(H) Dismissal from a company for any of the above reasons.
(I) Suspension or revocation of one's certification by another entity.

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

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

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

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

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

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

Measurement and Payment

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

PROCEDURE FOR MONITORING BORROW PIT DISCHARGE:

(2-20-07) (Rev. 3-19-13) 105-16, 230, 801 SP1 G181

Water discharge from borrow pit sites shall not cause surface waters to exceed 50 NTUs (nephelometric turbidity unit) in streams not designated as trout waters and 10 NTUs in streams, lakes or reservoirs designated as trout waters. For lakes and reservoirs not designated as trout waters, the turbidity shall not exceed 25 NTUs. If the turbidity exceeds these levels due to natural background conditions, the existing turbidity level shall not be increased.

If during any operating day, the downstream water quality exceeds the standard, the Contractor shall do all of the following:

(A) Either cease discharge or modify the discharge volume or turbidity levels to bring the downstream turbidity levels into compliance, or

(B) Evaluate the upstream conditions to determine if the exceedance of the standard is due to natural background conditions. If the background turbidity measurements exceed the standard, operation of the pit and discharge can continue as long as the stream turbidity levels are not increased due to the discharge.

(C) Measure and record the turbidity test results (time, date and sampler) at all defined sampling locations 30 minutes after startup and at a minimum, one additional sampling of all sampling locations during that 24-hour period in which the borrow pit is discharging.

(D) Notify DWQ within 24 hours of any stream turbidity standard exceedances that are not brought into compliance.

During the Environmental Assessment required by Article 230-4 of the *2012 Standard Specifications*, the Contractor shall define the point at which the discharge enters into the State's surface waters and the appropriate sampling locations. Sampling locations shall include points upstream and downstream from the point at which the discharge enters these waters. Upstream sampling location shall be located so that it is not influenced by backwater conditions and represents natural background conditions. Downstream sampling location shall be located at the point where complete mixing of the discharge and receiving water has occurred.

The discharge shall be closely monitored when water from the dewatering activities is introduced into jurisdictional wetlands. Any time visible sedimentation (deposition of sediment) on the wetland surface is observed, the dewatering activity will be suspended until turbidity levels in the stilling basin can be reduced to a level where sediment deposition does not occur. Staining of wetland surfaces from suspended clay particles, occurring after evaporation or infiltration, does not constitute sedimentation. No activities shall occur in wetlands that adversely affect the functioning of a wetland. Visible sedimentation will be considered an indication of possible adverse impacts on wetland use.

The Engineer will perform independent turbidity tests on a random basis. These results will be maintained in a log within the project records. Records will include, at a minimum, turbidity test results, time, date and name of sampler. Should the Department's test results exceed those of the Contractor's test results, an immediate test shall be performed jointly with the results superseding the previous test results of both the Department and the Contractor.

The Contractor shall use the *NCDOT Turbidity Reduction Options for Borrow Pits Matrix,* available at http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/fieldops/downloads/Files/TurbidityReductionOptionSheet.pdf to plan, design, construct, and maintain BMPs to address water quality standards. Tier I Methods include stilling basins which are standard compensatory BMPs. Other Tier I methods are noncompensatory and shall be used when needed

to meet the stream turbidity standards. Tier II Methods are also noncompensatory and are options that may be needed for protection of rare or unique resources or where special environmental conditions exist at the site which have led to additional requirements being placed in the DWQ's 401 Certifications and approval letters, Isolated Wetland Permits, Riparian Buffer Authorization or a DOT Reclamation Plan's Environmental Assessment for the specific site. Should the Contractor exhaust all Tier I Methods on a site exclusive of rare or unique resources or special environmental conditions, Tier II Methods may be required by regulators on a case by case basis per supplemental agreement.

The Contractor may use cation exchange capacity (CEC) values from proposed site borings to plan and develop the bid for the project. CEC values exceeding 15 milliequivalents per 100 grams of soil may indicate a high potential for turbidity and should be avoided when dewatering into surface water is proposed.

No additional compensation for monitoring borrow pit discharge will be paid.

EMPLOYMENT:
(11-15-11) (Rev. 1-17-12) 108, 102 SP1 G184

Revise the *2012 Standard Specifications* as follows:

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

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

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

STATE HIGHWAY ADMINISTRATOR TITLE CHANGE:
(9-18-12) SP1 G185

Revise the *2012 Standard Specifications* as follows:

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

PROJECT SPECIAL PROVISIONS

ROADWAY

CLEARING AND GRUBBING - METHOD III:

(4-6-06) (Rev. 1-17-12) 200 SP2 R02B

Perform clearing on this project to the limits established by Method "III shown on Standard Drawing No. 200.03 of the *2012 Roadway Standard Drawings*.

BUILDING REMOVAL:

(1-1-02) (Rev. 4-16-13) 215 SP2 R15 A

Remove the buildings, underground storage tanks and appurtenances listed below in accordance with Section 215 of the *2012 Standard Specifications*:

Parcel 001 Left of 26 + 35 - L-
Frame Shed

LUMP SUM GRADING:

(8-17-10) 226 SP2 R16

Lump sum grading shall be performed in accordance with Section 226 Comprehensive Grading of the *2012 Standard Specifications* except as follows:

Delete all references to Section 225, Unclassified Excavation.

SHOULDER AND FILL SLOPE MATERIAL:

(5-21-02) 235, 560 SP2 R45 A

Description

Perform the required shoulder and slope construction for this project in accordance with the applicable requirements of Section 560 and Section 235 of the *2012 Standard Specifications*.

Measurement and Payment

Where the material has been obtained from an authorized stockpile or from a borrow source and *Borrow Excavation* is not included in the contract, no direct payment will be made for this work, as the cost of this work will be part of the work being paid at the contract lump sum price for *Grading*. If *Borrow Excavation* is included in this contract and the material has been obtained from an authorized stockpile or from a borrow source, measurement and payment will be as provided in Section 230 of the *2012 Standard Specifications* for *Borrow Excavation*.

HAZARDOUS SPILL BASIN/BIORETENTION BASIN:

(2-5-18) Special

Description

Construct hazardous spill basins with bioretention basins at locations indicated in the plans, in accordance with the contract and as directed by the Engineer.

Materials

(A) PVC and HDPE Pipe

Refer to Section 1032 of the *Standard Specifications.*

(B) Engineered Soil Mix

Provide an ESM (engineered soil mix) with the following physical properties:

(1) Homogenous soil mix of 85-88 percent by weight sand (USDA Soil Textural Classification), 8 to 12 percent fines (silt and clay), and 3 to 5 percent organic matter (such as peat moss).
(2) P-Index between 10 and 30
(3) pH value between 5.5 – 7.5
(4) Permeability between 1 and 2 inches/hour
(5) Uniform and free of stones, stumps, roots or other similar material greater than 2 inches

All the individual components as well as the ESM shall be reasonably free of weed seed or toxic substances or any other material which would be harmful to plant growth, and shall be maintained free from such during stockpiling, transport, and installation. If the ESM is to be stockpiled, the location chosen for stockpiling shall be reasonably free of weed seed, vegetation, toxic substances, or any other material which would be harmful to plant growth. Prior to stockpiling, the Engineer shall approve the stockpile location.

(a) Mixing
The ESM components shall be thoroughly mixed by a mechanical device designed specifically for producing uniform ESM. The process for mixing shall be submitted in writing to the Engineer prior to mixing. An on site inspection of the mixing procedure may be required prior to approval of the mixing process. No samples shall be prepared prior to receiving approval of the mixing process.

(b) Testing
During the mixing operation, the Contractor will be responsible for maintaining the ESM that meets the specifications. Random samples will be taken by the Engineer in order to test for mix uniformity and to verify that it remains within the specified ranges for the physical properties.

(c) Existing Soil Characteristics
The existing soil in the location of bioretention area will be tested by the Department, to determine the particle size analysis and to classify the percentage of sand, silt or loam and clay. If the percentages of existing sand, silt and clay fall within the range of percentages as specified above, only the chemical nutrients shall be added.

(C) Creek Stone

Provide Cane Creek Stone available from local North Carolina sources in a size range of approximately 5 to 17 inches in length by 5 to 17 inches in width and no more than 6 inches in depth. No more than 5.0% of the material furnished can be less than the

minimum size specified nor no more than 10.0% of the material can exceed the maximum size specified. The Creek Stone will be applied at a depth of 18 inches at locations shown on the plans and as directed by the engineer in the field. A representative sample and the source of the Cane Creek Stone will be submitted for the Engineer's approval prior to delivery and placement.

(D) Polypropylene Woven Monofilament Geotextile

The product shall be a woven polypropylene geotextile and will meet the following Minimum Average Roll Values (MARV) when tested in accordance with the methods listed below. The mat shall have the following physical properties:

Property	**Test Method**	Value	**Unit**
Tensile Strength (Grab)	ASTM D4632	370 x 220	lbs
Elongation	ASTM D4632	25 x 15	%
Puncture	ASTM D4833	115	lbs
Mullen Burst	ASTM D3786	470	psi
Trapezoidal Tear	ASTM D4533	115 x 75	lbs
UV Resistance	ASTM D4355	90	%
Apparent Opening Size (AOS)[3]	ASTM D4751	30	US Std. Sieve
Percent Open Area (POA)	CW-02215 Mod.[4]	11	%
Permittivity	ASTM D4491	1.10	Sec^{-1}
Water Flow Rate	ASTM D1682	110	Gpm/ft^2

Submit a certification (Type 1, 2, or 3) from the manufacturer showing:
(1) The chemical and physical properties of the mat used, and
(2) Conformance of the mat with this specification.

(E) Geotextile Fabric for Basin

The product shall be a woven silt film geotextile and will meet the following Minimum Average Roll Values (MARV) when tested in accordance with the methods listed below. The mat shall have the following physical properties:

Property	**Test Method**	**Value**	**Unit**
Tensile Strength (Grab)	ASTM D4632	200	lbs
Elongation	ASTM D4632	15	%
Puncture	ASTM D4833	95	lbs
Mullen Burst	ASTM D3786	460	psi
Trapezoidal Tear	ASTM D4533	75	lbs
UV Resistance	ASTM D4355	70	%
Apparent Opening Size (AOS)[3]	ASTM D4751	40	US Std. Sieve
Permittivity	ASTM D4491	0.05	Sec-1
Water Flow Rate		4	Gpm/ft2

Submit a certification (Type 1, 2, or 3) from the manufacturer showing:
(1) The chemical and physical properties of the mat used, and
(2) Conformance of the mat with this specification.

(F) Hardwood Mulch for Basin

Mulch will be double or triple shredded hardwood bark from a single source unless otherwise approved by the Engineer. It will contain no trash or foreign debris. Submit sample for approval prior to placement.

(G) No. 57 Stone

Refer to Section 1005 of the *Standard Specifications.*

Construction

Construct hazardous spill basin with bioretention basin in accordance with the plans and as directed by the Engineer.

Excavate the Bioretention facility to the dimensions, side slopes, and elevations shown on the plans in such a way so as to prevent large voids from occurring in the sides and bottom of the basin. The method of excavation shall minimize the compaction of the bottom of the Bioretention facility (the 'rake' method of working the bucket should be used). Prior to placing the geotextile, underdrain and the ESM, till the bottom of the excavation to a minimum depth of 12 to alleviate any compaction of the facility bottom.

Excavation shall be performed in such a way so as to prevent large voids from occurring in the sides and bottom of the basin. The surface of the soil shall be smooth, firm, stable and free of rocks, clods, roots or other obstructions that would prevent the geotextile from lying in direct contact with the soil surface.

In the placement of the geotextile for drainage applications, the geotextile shall be placed loosely with no wrinkles or folds, and with no void spaces between the geotextile and the ground surface. Successive sheets of geotextiles shall be overlapped a minimum of 12 inches, with the upstream sheet overlapping the downstream sheet. Overlaps shall be sewn or otherwise bonded. All seams shall be subject to the approval of the Engineer. Should the geotextile be damaged during installation or drainage aggregate placement, a geotextile patch shall be placed over the damaged area extending beyond the damaged area a minimum distance of 12 inches, or the specified seam overlap, whichever is greater.

Place No. 57 stone drainage aggregate immediately following placement of the geotextile. The geotextile shall be covered with a minimum of 12 inches of loosely placed aggregate. If a perforated collector pipe is to be installed, a bedding layer of drainage aggregate should be placed below the pipe, with the remainder of the aggregate placed to the minimum required construction depth.

Atmospheric exposure of the geotextile to the elements following lay down shall be limited to 14 days to prevent damage.

Prepare surfaces on which polypropylene woven monofilament geotextile fabric is to be placed to smooth condition as indicated or as directed by the Engineer. Remove debris, depressions, and obstructions that could damage the polypropylene woven monofilament geotextile fabric. The surface of the loosely placed aggregate shall be free of clods, roots or other obstructions that would prevent the geotextile from lying in direct contact with the aggregate.

Install polypropylene woven monofilament geotextile fabric at the proper elevation and alignment as shown on the plans or as directed by the Engineer.

Successive sheets of polypropylene woven monofilament geotextile fabric shall be overlapped a minimum of 12 inches, with the upstream sheet overlapping the downstream sheet. Overlaps shall be sewn or otherwise bonded. All seams shall be subject to the approval of the Engineer. Should the polypropylene woven monofilament geotextile fabric be damaged during installation or engineered soil placement, a geotextile patch shall be placed over the damaged area extending beyond the damaged area a minimum distance of 12 inches, or the specified seam overlap, whichever is greater.

Placement of engineered soil should proceed immediately following placement of the polypropylene woven monofilament geotextile fabric. The polypropylene woven monofilament geotextile fabric should be covered with a minimum of 12 inches of loosely placed engineered soil. Select construction equipment that will prevent excess rutting.

On side slopes, anchor polypropylene woven monofilament geotextile fabric at top, then unroll. Keep polypropylene woven monofilament geotextile fabric free of wrinkles and folds.

Cut polypropylene woven monofilament geotextile fabric using upward cutting hook blade.

Use sandbags or other weights to prevent wind displacement.

Atmospheric exposure of the polypropylene woven monofilament geotextile fabric to the elements following lay down shall be limited to 14 days to prevent damage.

Vehicles and construction equipment shall not be operated directly over installed polypropylene woven monofilament geotextile fabric without approval of the Engineer.

Place and grade the ESM using low ground-contact pressure equipment or by excavators and/or backhoes operating on the ground adjacent to the Bioretention facility. The ESM shall be placed in horizontal layers not to exceed 12 for the entire area of the Bioretention facility. The ESM shall be compacted by saturating the entire area of the Bioretention facility after each lift of ESM is placed until water flows from the underdrain. Water for saturation shall be applied by spraying or sprinkling. Saturation of each lift shall be performed in the presence of the Engineer. An appropriate sediment control device shall be used to treat any sediment-laden water discharged from the underdrain. If the ESM becomes contaminated during the construction of the facility, the contaminated material shall be removed and replaced with uncontaminated material. Final grading of the ESM shall be performed after a 24-hour settling period. Final elevation shall be within one inch of the elevation shown on the plans.

Install pipe in accordance with the contract.

Perform earthwork in accordance with the contract.

Perform all items of work related to Hazardous Spill Basin/Bioretention Basin construction in accordance with the contract.

Measurement and Payment

Payment for the work of constructing the Hazardous Spill Basin/Bioretention Basin will be made at the contract lump sum price for *Hazardous Spill Basin/Bioretention Basin.* Such price and payment will be full compensation for all items associated with constructing the Hazardous Spill

Basin/Bioretention Basin, except those specifically paid for as other items as specified in the contract documents. The contract lump sum price for *Hazardous Spill Basin/Bioretention Basin* includes, but is not limited to, geotextile fabrics, HDPE pipes, PVC pipes, excavation for filter bed, engineered soil, creek stone, #57 Stone, hardwood mulch (for basin) and all materials, labor, equipment, and incidentals necessary to complete the work.

Sodding will be measured and paid in accordance with Section 1664 of the *Standard Specifications*.

Pipe Culverts will be measured and paid in accordance with Section 310 of the *Standard Specifications*.

Masonry Drainage Structures will be measured and paid in accordance with Section 840 of the *Standard Specifications*. Payment for *Masonry Drainage Structures* includes the trash rack.

Reticuline Frame and Grate will be measured and paid as provided elsewhere in the contract.

Sluice Gate will be measured and paid as provided elsewhere in the contract.

Payment will be made under:

Pay Item	**Pay Unit**
Hazardous Spill Basin/Bioretention Basin	Lump Sum

PIPE INSTALLATION:

(11-20-12) 300 SP3 R01

Revise the *2012 Standard Specifications* as follows:

Page 3-1, Article 300-2, Materials, line 23-24, replace sentence with:

Provide foundation conditioning geotextile in accordance with Section 1056 for Type 4 geotextile.

ASPHALT PAVEMENTS - SUPERPAVE:

(6-19-12) (Rev. 2-18-14) 605, 609, 610, 650, 660 SP6 R01

Revise the *2012 Standard Specifications* as follows:

Page 6-3, Article 605-7 APPLICATION RATES AND TEMPERATURES, replace this article, including Table 601-1, with the following:

Apply tack coat uniformly across the existing surface at target application rates shown in Table 605-1.

TABLE 605-1
APPLICATION RATES FOR TACK COAT

Existing Surface	**Target Rate (gal/sy)**
	Emulsified Asphalt
New Asphalt	0.04 ± 0.01
Oxidized or Milled Asphalt	0.06 ± 0.01
Concrete	0.08 ± 0.01

Apply tack coat at a temperature within the ranges shown in Table 605-2. Tack coat shall not be overheated during storage, transport or at application.

TABLE 605-2 APPLICATION TEMPERATURE FOR TACK COAT	
Asphalt Material	**Temperature Range**
Asphalt Binder, Grade PG 64-22	350 - 400°F
Emulsified Asphalt, Grade RS-1H	130 - 160°F
Emulsified Asphalt, Grade CRS-1	130 - 160°F
Emulsified Asphalt, Grade CRS-1H	130 - 160°F
Emulsified Asphalt, Grade HFMS-1	130 - 160°F
Emulsified Asphalt, Grade CRS-2	130 - 160°F

Page 6-7, Article 609-3 FIELD VERIFICATION OF MIXTURE AND JOB MIX FORMULA ADJUSTMENTS, lines 35-37, delete the second sentence of the second paragraph.

Page 6-18, Article 610-1 DESCRIPTION, lines 40-41, delete the last sentence of the last paragraph.

Page 6-19, Subarticle 610-3(A) Mix Design-General, line 5, add the following as the first paragraph:

Warm mix asphalt (WMA) is allowed for use at the Contractor's option in accordance with the NCDOT Approved Products List for WMA Technologies available at:

https://connect.ncdot.gov/resources/Materials/MaterialsResources/Warm%20Mix%20Asphalt%20Approved%20List.pdf

Page 6-21, Subarticle 610-3(C) Job Mix Formula (JMF), replace Table 610-1 with the following:

TABLE 610-1 DESIGN MIXING TEMPERATURE AT THE ASPHALT PLANT[A]		
Binder Grade	**HMA JMF Temperature**	**WMA JMF Temperature Range**
PG 64-22	300°F	225 - 275°F
PG 70-22	315°F	240 - 290°F
PG 76-22	335°F	260 - 310°F

A. The mix temperature, when checked in the truck at the roadway, shall be within plus 15° and minus 25° of the temperature specified on the JMF.

Page 6-21, Subarticle 610-3(C) Job Mix Formula (JMF), lines 4-6, delete first sentence of the second paragraph. Line 7, in the second sentence of the second paragraph, replace "275°F with "275°F or greater.

Page 6-22, Article 610-4 WEATHER, TEMPERATURE AND SEASONAL LIMITATIONS FOR PRODUCING AND PLACING ASPHALT MIXTURES, lines 15-17, replace the second sentence of the first paragraph with the following:

Do not place asphalt material when the air or surface temperatures, measured at the location of the paving operation away from artificial heat, do not meet Table 610-5.

Page 6-23, Article 610-4 WEATHER, TEMPERATURE AND SEASONAL LIMITATIONS FOR PRODUCING AND PLACING ASPHALT MIXTURES, replace Table 610-5 with the following:

TABLE 610-5
PLACEMENT TEMPERATURES FOR ASPHALT

Asphalt Concrete Mix Type	Minimum Surface and Air Temperature
B25.0B, C	35°F
I19.0B, C, D	35°F
SF9.5A, S9.5B	40°F
S9.5C, S12.5C	45°F
S9.5D, S12.5D	50°F

Page 6-26, Article 610-7 HAULING OF ASPHALT MIXTURE, lines 22-23, in the fourth sentence of the first paragraph replace "so as to overlap the top of the truck bed and with "to .

Page 6-41, Subarticle 650-3(B) Mix Design Criteria, replace Table 650-1 with the following:

TABLE 650-1
OGAFC GRADATION CRITERIA

Grading Requirements	**Total Percent Passing**		
Sieve Size (mm)	*Type FC-1*	*Type FC-1 Modified*	*Type FC-2 Modified*
19.0	-	-	100
12.5	100	100	**80** - 100
9.50	75 - 100	75 - 100	55 - **80**
4.75	25 - 45	25 - 45	15 - **30**
2.36	5 - 15	5 - 15	5 - **15**
0.075	1.0 - 3.0	1.0 - 3.0	2.0 - 4.0

Page 6-50, Table 660-1 MATERIAL APPLICATION RATES AND TEMPERATURES, lines 1-2, replace Note A in Table 660-1 with the following:

A. Use No. 6M, No. 67, No. 5 and No. 78M aggregate for retreatment before an asphalt overlay on existing pavement based on the width of the cracks in the existing pavement. Choose No. 78M for sections of roadway where the average width of existing cracks is 1/4" or less in width, No. 67 for sections of roadway where the average width of existing cracks are 1/4" to 5/8" in width and choose No. 5 for sections of roadway where the existing crack widths are greater than 5/8".

ASPHALT BINDER CONTENT OF ASPHALT PLANT MIXES:
(11-21-00) (Rev. 7-17-12) 609 SP6 R15

The approximate asphalt binder content of the asphalt concrete plant mixtures used on this project will be as follows:

Asphalt Concrete Base Course	Type B 25.0__	4.4%
Asphalt Concrete Intermediate Course	Type I 19.0__	4.8%
Asphalt Concrete Surface Course	Type S 4.75A	6.8%
Asphalt Concrete Surface Course	Type SA-1	6.8%
Asphalt Concrete Surface Course	Type SF 9.5A	6.7%
Asphalt Concrete Surface Course	Type S 9.5__	6.0%
Asphalt Concrete Surface Course	Type S 12.5__	5.6%

The actual asphalt binder content will be established during construction by the Engineer within the limits established in the *2012 Standard Specifications.*

ASPHALT PLANT MIXTURES:
(7-1-95) 609 SP6 R20

Place asphalt concrete base course material in trench sections with asphalt pavement spreaders made for the purpose or with other equipment approved by the Engineer.

PRICE ADJUSTMENT - ASPHALT BINDER FOR PLANT MIX:
(11-21-00) 620 SP6 R25

Price adjustments for asphalt binder for plant mix will be made in accordance with Section 620 of the *2012 Standard Specifications.*

The base price index for asphalt binder for plant mix is **$ 559.29** per ton.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **February 1, 2014**.

FINAL SURFACE TESTING NOT REQUIRED:
(5-18-04) (Rev. 5-15-12) 610 SP6 R45

Final surface testing is not required on this project.

SLUICE GATE:
(7-1-95) (Rev. 3-17-09) 838 SP8 R20

Description

This work consists of the construction of a sluice gate on an endwall in accordance with the details in the plans, the applicable requirements of Section 838 of the *2012 Standard Specifications*, in accordance with the manufacturer's recommendations and as directed by the Engineer.

Materials

Sluice gates shall meet the manufacturer's recommendations for the corresponding pipe size. Due to variations in individual manufacturer's products, a slight variation from the size specified may be allowed. Submit the proposed catalog cut to the Engineer for approval prior to use.

Construction Methods

Provide a gate that forms a watertight seal when closed.

Measurement and Payment

____" *Sluice Gate* will be measured and paid as each for the actual number of sluice gates incorporated into the completed and accepted work. Such prices and payment will be full compensation for all materials, labor, tools, equipment and incidentals necessary to complete the work.

The endwall will be measured and paid in accordance with Article 838-4 of the *2012 Standard Specifications*.

Payment will be made under:

Pay Item	Pay Unit
____" Sluice Gate	Each

RETICULINE FRAME AND GRATE:

Description

Furnish and install reticuline frames and grates in accordance with this provision and the plan detail sheets, at locations designated on the plans.

Material

The frame and grate shall be fabricated using steel meeting the requirements of ASTM A588, A572, A242, or A441. The grate shall be non-traffic bearing, a minimum of 2 inches thick with a minimum bar spacing of 1 inch and a maximum of 3 inches.

Measurement and Payment

Reticuline Frame and Grate shall be measured and paid for in units of each that have been incorporated into the completed and accepted work.

Pay Item	Pay Unit
Reticuline Frame and Grate	Each

WEATHERING STEEL BEAM GUARDRAIL (Painted Lap):

12-18-09 SPI 8-33(Rev)

Description

Install steel beam guardrail (weathering steel) at locations shown on the plans in accordance with Section 862 of the *Standard Specifications*.

Materials

Material used in the steel beam guardrail and posts shall meet the corrosion requirements of Unpainted Structural Steel ASTM A242.

Submit Type 1 Certified Mill Test Report in accordance with Section 106-3 of the *Standard Specifications*. The Engineer reserves the right to sample the materials.

Painting of laps shall be performed in accordance with the requirements of Section 1080 and Section 442 of the *2012 Standard Specifications* using System 4 as modified herein.

System 4 (Modified)
Acrylic Primer and Top Coats

Coat	Material	Mils Dry/Wet Film Thickness	Mils Dry/Wet Film Thickness
		Minimum	Maximum
Primer	1080-12 White	3.0 DFT	5.0 DFT
Stripe	1080-12 Brown	4.0 WFT	7.0 WFT
Topcoat	1080-12 Brown	2.0 DFT	4.0 DFT
Total		5.0 DFT	9.0 DFT

Construction Methods

Install guardrail with a uniform color appearance on the outside surfaces on the roadway face of the guardrail. A brush-off blast cleaning or brushing in the field may be required after erection, if weathering of the sections has not been consistent.

Use reflectorized washers on curve areas where nighttime visibility is required.

At locations where the guardrail is lapped, the ends of both sections to be lapped shall be coated in accordance with Section 442 of the *Standard Specifications* for Paint System 4 as modified above. The coated back on the end of one rail shall be placed over the end with a coated front on the adjacent rail. Only the side of the rail that is in contact with the adjacent rail shall be coated and each rail shall be coated for the entire length of the lap.

Measurement and Payment

Weathering Steel Beam Guardrail with Painted Laps will be measured and paid for in linear feet of guardrail that has been satisfactorily completed and accepted exclusive of that length of guardrail that is within the pay limits of guardrail anchors. Measurement will be made from center to center of the outermost post in the length of guardrail being measured.

Weathering Steel Beam Guardrail with Painted Laps, Shop Curved will be measured and paid for in linear feet of guardrail that has been satisfactorily completed and accepted exclusive of that length of guardrail that is within the pay limits of guardrail anchors. Measurement will be made from center to center of the outermost post in the length of guardrail being measured.

Weathering Steel Additional Guardrail Posts will be measured and paid in units of each for additional posts required but not shown in the plans.

Weathering Steel Beam Guardrail Anchor Units, Type AT-1 with Painted Laps will be measured and paid as units of each completed and accepted. No separate measurement will be made of any rail, terminal sections, posts, offset blocks, concrete, hardware or any other components of the completed unit that are within the pay limits shown in the plans for the unit as all such components will be considered to be part of the unit

Such price and payment will be full compensation for all work covered by this provision including but not limited to furnishing and erecting weathered posts, offset blocks, rail, miscellaneous hardware, painting of laps and all other materials and all incidentals necessary to complete the work satisfactorily.

Payment will be made under:

Pay Item	**Pay Unit**
Weathering Steel Beam Guardrail with Painted Laps	Linear Foot
Weathering Steel Beam Guardrail with Painted Laps, Shop Curved	Linear Foot
Weathering Steel Additional Guardrail Posts	Each
Weathering Steel Beam Guardrail Anchor Units, Type AT-1 With Painted Laps	Each

PAINTED GUARDRAIL ANCHOR UNITS, TYPE 350

(9-19-06) (Rev 5-2-13) SPI 8-24(Rev)

Description

Furnish and install painted galvanized steel beam guardrail anchor units in accordance with the details in the plans, the applicable requirements of Section 862 of the *2012 Standard Specifications*, and at locations shown on the plans.

Materials

Refer to Division 10 of the *2012 Standard Specifications*.

Item	**Section**
Galvanizing	1076
Reflective sheeting	1088-3

Guardrail materials shall meet the requirements of Section 1046 of the *2012 Standard Specifications* except that guardrail materials shall not be water quenched or treated with chromate conversion coatings.

For painted Guardrail Anchor Units, Type 350, the Contractor may at his option, furnish any one of the following guardrail anchor units or approved equal.

Guardrail anchor unit (ET-Plus) as manufactured by:

Trinity Industries, Inc.
2525 N. Stemmons Freeway
Dallas, Texas 75207
Telephone: 800-644-7976

The guardrail anchor unit (SKT 350) as manufactured by:

Road Systems, Inc.
3616 Old Howard County Airport
Big Spring, Texas 79720
Telephone: 915-263-2435

Prior to installation the Contractor shall submit the following to the Engineer:

(A) FHWA acceptance letter for each guardrail anchor unit certifying it meets the requirements of NCHRP Report 350, Test Level 3, in accordance with Article 106-2 of the *2012 Standard Specifications*.

(B) Certified working drawings and assembling instructions from the manufacturer for each guardrail anchor unit in accordance with Article 105-2 of the *2012 Standard Specifications*.

No modifications shall be made to the guardrail anchor unit without the express written permission from the manufacturer. Perform installation in accordance with the details in the plans, and details and assembling instructions furnished by the manufacturer.

Painting shall be performed in accordance with Section 1080 and Section 442 of the *2012 Standard Specifications* using System 4 as modified herein.

System 4 (Modified)
Acrylic Primer and Top Coats

Coat	Material	Mils Dry/Wet Film Thickness	Mils Dry/Wet Film Thickness
		Minimum	Maximum
Primer	1080-12 White	3.0 DFT	5.0 DFT
Stripe	1080-12 Brown	4.0 WFT	7.0 WFT
Topcoat	1080-12 Brown	2.0 DFT	4.0 DFT
Total		5.0 DFT	9.0 DFT

Construction Methods

(A) *Preparation of galvanized beams and hardware for painting:* Perform surface smoothing by removing or cleaning all zinc high spots, such as metal drip line, by hand or power tools in accordance with SSPC SP 2 or 3. Level zinc material flush with the surrounding plane without removing the base coating.

Abrasive sweep blasting shall be performed in accordance with Section 5.4.1 of ASTM D6386. This section also provides a description of the abrasive blast material to be used. The material and technique used will provide a stripping action to remove corrosion products and to provide a rough surface profile while leaving base zinc layers intact.

All surfaces of the blasted beams and hardware shall be blown down with clean compressed air to provide a clean, dry surface for additional coating to be applied.

All surfaces shall be free of visible zinc oxides or zinc hydroxides.

(B) (1) *Certification*: Only SSPC QP-3 certified contractor shall shop paint guardrail material.

(2) *Shop Paint*: Galvanized guardrail beams, both front and back, posts, anchor units and hardware shall be shop painted within 8 hours after surface preparation except paint bolt heads after installation.

(C) *Repair of Damaged Coating*: Repair damage occurring to the galvanized portion of the coating during shipment or installation in accordance with Articles 1076-7 and 1080-9 of the *2012 Standard Specifications*. Repair damage occurring to the painted portion of the coating during shipment or installation by applying 4.0 to 7.0 wet mils of topcoat with a brush or roller and feather or taper this to be level with the surrounding areas.

(D) *Guardrail Installation*: Install guardrail in accordance with Section 862, details in the plans, and details and assembling instructions furnished by the manufacturer. Guardrail end delineation shall be applied to the entire end section of all approach and trailing end sections.

(E) Guardrail end delineation is required on all approach and trailing end sections for both temporary and permanent installations. Guardrail end delineation consists of yellow reflective sheeting applied to the entire end section of the guardrail in accordance with Article 1088-3 of the *2012 Standard Specifications* and is incidental to the cost of the guardrail anchor unit.

Measurement and Payment

Painted Guardrail Anchor Units, Type 350 will be measured and paid for in accordance with the applicable requirements of Article 862-6 of the *2012 Standard Specifications.*

Such price and payment includes, but is not limited to furnishing and erecting posts, offset blocks, rail, miscellaneous hardware, and all other materials, backfilling; fabrication; welding; painting, galvanizing; furnishing and installing guardrail delineators and end delineation.

Payment will be made under:

Pay Item	Pay Unit
Painted Guardrail Anchor Units, Type 350	Each

DETECTABLE WARNINGS FOR PROPOSED CURB RAMPS:

(6-15-10) (Rev. 8-16-11) 848 SP8 R126

Description

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

Materials

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

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

Install detectable warnings created from one of the following materials: precast concrete blocks or bricks, clay paving brick, gray or ductile iron castings, mild steel, stainless steel, and engineered plastics, rubber or composite tile. Only one material type for detectable warning will be permitted per project, unless otherwise approved by the Engineer.

(A) Detectable Warnings shall consist of a base with integrated raised truncated domes, and when constructed of precast concrete they shall conform to the material requirements of Article 848-2 of the *2012 Standard Specifications.*

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

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

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

Construction Methods

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

(B) Install all detectable warning in proposed concrete curb ramps in accordance with the manufacturer's recommendations.

Measurement and Payment

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

FOUNDATIONS AND ANCHOR ROD ASSEMBLIES FOR METAL POLES:

(1-17-12) (Rev. 5-21-13) 9, 14, 17 SP9 R05

Description

Foundations for metal poles include foundations for signals, cameras, overhead and dynamic message signs (DMS) and high mount and low level light standards supported by metal poles or upright trusses. Foundations consist of footings with pedestals and drilled piers with or without grade beams or wings. Anchor rod assemblies consist of anchor rods (also called anchor bolts) with nuts and washers on the exposed ends of rods and nuts and a plate or washers on the other ends of rods embedded in the foundation.

Construct concrete foundations with the required resistances and dimensions and install anchor rod assemblies in accordance with the contract and accepted submittals. Construct drilled piers

consisting of cast-in-place reinforced concrete cylindrical sections in excavated holes. Provide temporary casings or polymer slurry as needed to stabilize drilled pier excavations. Use a prequalified Drilled Pier Contractor to construct drilled piers for metal poles. Define "excavation and "hole as a drilled pier excavation and "pier as a drilled pier.

This provision does not apply to materials and anchor rod assemblies for standard foundations for low level light standards. See Section 1405 of the *2012 Standard Specifications* and Standard Drawing No. 1405.01 of the *2012 Roadway Standard Drawings* for materials and anchor rod assemblies for standard foundations. For construction of standard foundations for low level light standards, standard foundations are considered footings in this provision.

This provision does not apply to foundations for signal pedestals; see Section 1743 of the *2012 Standard Specifications* and Standard Drawing No. 1743.01 of the *2012 Roadway Standard Drawings*.

Materials

Refer to the *2012 Standard Specifications*.

Item	**Section**
Conduit	1091-3
Grout, Nonshrink	1003
Polymer Slurry	411-2(B)
Portland Cement Concrete	1000
Reinforcing Steel	1070
Rollers and Chairs	411-2(C)
Temporary Casings	411-2(A)

Provide Type 3 material certifications in accordance with Article 106-3 of the *2012 Standard Specifications* for conduit, rollers, chairs and anchor rod assemblies. Store steel materials on blocking at least 12" above the ground and protect it at all times from damage; and when placing in the work make sure it is free from dirt, dust, loose mill scale, loose rust, paint, oil or other foreign materials. Load, transport, unload and store foundation and anchor rod assembly materials so materials are kept clean and free of damage. Bent, damaged or defective materials will be rejected.

Use conduit type in accordance with the contract. Use Class A concrete for footings and pedestals, Class Drilled Pier concrete for drilled piers and Class AA concrete for grade beams and wings including portions of drilled piers above bottom of wings elevations. Corrugated temporary casings may be accepted at the discretion of the Engineer. A list of approved polymer slurry products is available from:
connect.ncdot.gov/resources/Geological/Pages/Products.aspx

Provide anchor rod assemblies in accordance with the contract consisting of the following:

(A) Straight anchor rods,

(B) Heavy hex top and leveling nuts and flat washers on exposed ends of rods, and

(C) Nuts and either flat plates or washers on the other ends of anchor rods embedded in foundations.

Do not use lock washers. Use steel anchor rods, nuts and washers that meet ASTM F1554 for Grade 55 rods and Grade A nuts. Use steel plates and washers embedded in concrete with a thickness of at least 1/4". Galvanize anchor rods and exposed nuts and washers in accordance with Article 1076-4 of the *2012 Standard Specifications*. It is not necessary to galvanize nuts, plates and washers embedded in concrete.

Construction Methods

Install the required size and number of conduits in foundations in accordance with the plans and accepted submittals. Construct top of piers, footings, pedestals, grade beams and wings flat, level and within 1" of elevations shown in the plans or approved by the Engineer. Provide an Ordinary Surface finish in accordance with Subarticle 825-6(B) of the *2012 Standard Specifications* for portions of foundations exposed above finished grade. Do not remove anchor bolt templates or pedestal or grade beam forms or erect metal poles or upright trusses onto foundations until concrete attains a compressive strength of at least 3,000 psi.

(A) Drilled Piers

Before starting drilled pier construction, hold a predrill meeting to discuss the installation, monitoring and inspection of the drilled piers. Schedule this meeting after the Drilled Pier Contractor has mobilized to the site. The Resident or Division Traffic Engineer, Contractor and Drilled Pier Contractor Superintendent will attend this predrill meeting.

Do not excavate holes, install piles or allow equipment wheel loads or vibrations within 20 ft of completed piers until 16 hours after Drilled Pier concrete reaches initial set.

Check for correct drilled pier alignment and location before beginning drilling. Check plumbness of holes frequently during drilling.

Construct drilled piers with the minimum required diameters shown in the plans. Install piers with tip elevations no higher than shown in the plans or approved by the Engineer.

Excavate holes with equipment of the sizes required to construct drilled piers. Depending on the subsurface conditions encountered, drilling through rock and boulders may be required. Do not use blasting for drilled pier excavations.

Contain and dispose of drilling spoils and waste concrete as directed and in accordance with Section 802 of the *2012 Standard Specifications*. Drilling spoils consist of all materials and fluids removed from excavations.

If unstable, caving or sloughing materials are anticipated or encountered, stabilize holes with temporary casings and/or polymer slurry. Do not use telescoping temporary casings. If it becomes necessary to replace a temporary casing during drilling, backfill the excavation, insert a larger casing around the casing to be replaced or stabilize the excavation with polymer slurry before removing the temporary casing.

If temporary casings become stuck or the Contractor proposes leaving casings in place, temporary casings should be installed against undisturbed material. Unless otherwise approved, do not leave temporary casings in place for mast arm poles and cantilever signs. The Engineer will determine if casings may remain in place. If the Contractor proposes leaving temporary casings in place, do not begin drilling until a casing installation method is approved.

Use polymer slurry and additives to stabilize holes in accordance with the slurry manufacturer's recommendations. Provide mixing water and equipment suitable for polymer slurry. Maintain polymer slurry at all times so slurry meets Table 411-3 of the *2012 Standard Specifications* except for sand content.

Define a "sample set as slurry samples collected from mid-height and within 2 ft of the bottom of holes. Take sample sets from excavations to test polymer slurry immediately after filling holes with slurry, at least every 4 hours thereafter and immediately before placing concrete. Do not place Drilled Pier concrete until both slurry samples from an excavation meet the required polymer slurry properties. If any slurry test results do not meet the requirements, the Engineer may suspend drilling until both samples from a sample set meet the required slurry properties.

Remove soft and loose material from bottom of holes using augers to the satisfaction of the Engineer. Assemble rebar cages and place cages and Drilled Pier concrete in accordance with Subarticle 411-4(E) of the *2012 Standard Specifications* except for the following:

(1) Inspections for tip resistance and bottom cleanliness are not required,
(2) Temporary casings may remain in place if approved, and
(3) Concrete placement may be paused near the top of pier elevations for anchor rod assembly installation and conduit placement or
(4) If applicable, concrete placement may be stopped at bottom of grade beam or wings elevations for grade beam or wing construction.

If wet placement of concrete is anticipated or encountered, do not place Drilled Pier concrete until a concrete placement procedure is approved. If applicable, temporary casings and fluids may be removed when concrete placement is paused or stopped in accordance with the exceptions above provided holes are stable. Remove contaminated concrete from exposed Drilled Pier concrete after removing casings and fluids. If holes are unstable, do not remove temporary casings until a procedure for placing anchor rod assemblies and conduit or constructing grade beams or wings is approved.

Use collars to extend drilled piers above finished grade. Remove collars after Drilled Pier concrete sets and round top edges of piers.

If drilled piers are questionable, pile integrity testing (PIT) and further investigation may be required in accordance with Article 411-5 of the *2012 Standard Specifications*. A drilled pier will be considered defective in accordance with Subarticle 411-5(D) of the *2012 Standard Specifications* and drilled pier acceptance is based in part on the criteria in Article 411-6 of the *2012 Standard Specifications* except for the top of pier tolerances in Subarticle 411-6(C) of the *2012 Standard Specifications*.

If a drilled pier is under further investigation, do not grout core holes, backfill around the pier or perform any work on the drilled pier until the Engineer accepts the pier. If the drilled pier is accepted, dewater and grout core holes and backfill around the pier with approved material to finished grade. If the Engineer determines a pier is unacceptable, remediation is required in accordance with Article 411-6 of the *2012 Standard Specifications*. No extension of completion date or time will be allowed for remediation of unacceptable drilled piers or post repair testing.

Permanently embed a plate in or mark top of piers with the pier diameter and depth, size and number of vertical reinforcing bars and the minimum compressive strength of the concrete mix at 28 days.

(B) Footings, Pedestals, Grade Beams and Wings

Excavate as necessary for footings, grade beams and wings in accordance with the plans, accepted submittals and Section 410 of the *2012 Standard Specifications*. If unstable, caving or sloughing materials are anticipated or encountered, shore foundation excavations as needed with an approved method. Notify the Engineer when foundation excavation is complete. Do not place concrete or reinforcing steel until excavation dimensions and foundation material are approved.

Construct cast-in-place reinforced concrete footings, pedestals, grade beams and wings with the dimensions shown in the plans and in accordance with Section 825 of the *2012 Standard Specifications*. Use forms to construct portions of pedestals and grade beams protruding above finished grade. Provide a chamfer with a 3/4" horizontal width for pedestal and grade beam edges exposed above finished grade. Backfill and fill in accordance with Article 410-8 of the *2012 Standard Specifications*. Proper compaction around footings and wings is critical for foundations to resist uplift and torsion forces. Place concrete against undisturbed soil and do not use forms for standard foundations for low level light standards.

(C) Anchor Rod Assemblies

Size anchor rods for design and the required projection above top of foundations. Determine required anchor rod projections from nut, washer and base plate thicknesses, the protrusion of 3 to 5 anchor rod threads above top nuts after tightening and the distance of one nut thickness between top of foundations and bottom of leveling nuts.

Protect anchor rod threads from damage during storage and installation of anchor rod assemblies. Before placing anchor rods in foundations, turn nuts onto and off rods past leveling nut locations. Turn nuts with the effort of one workman using an ordinary wrench without a cheater bar. Report any thread damage to the Engineer that requires extra effort to turn nuts.

Arrange anchor rods symmetrically about center of base plate locations as shown in the plans. Set anchor rod elevations based on required projections above top of foundations.

Securely brace and hold rods in the correct position, orientation and alignment with a steel template. Do not weld to reinforcing steel, temporary casings or anchor rods.

Install top and leveling (bottom) nuts, washers and the base plate for each anchor rod assembly in accordance with the following procedure:

(1) Turn leveling nuts onto anchor rods to a distance of one nut thickness between the top of foundation and bottom of leveling nuts. Place washers over anchor rods on top of leveling nuts.

(2) Determine if nuts are level using a flat rigid template on top of washers. If necessary, lower leveling nuts to level the template in all directions or if applicable, lower nuts to tilt the template so the metal pole or upright truss will lean as shown in the plans. If leveling nuts and washers are not in full contact with the template, replace washers with galvanized beveled washers.

(3) Verify the distance between the foundation and leveling nuts is no more than one nut thickness.

(4) Place base plate with metal pole or upright truss over anchor rods on top of washers. High mount luminaires may be attached before erecting metal poles but do not attach cables, mast arms or trusses to metal poles or upright trusses at this time.

(5) Place washers over anchor rods on top of base plate. Lubricate top nut bearing surfaces and exposed anchor rod threads above washers with beeswax, paraffin or other approved lubricant.

(6) Turn top nuts onto anchor rods. If nuts are not in full contact with washers or washers are not in full contact with the base plate, replace washers with galvanized beveled washers.

(7) Tighten top nuts to snug-tight with the full effort of one workman using a 12" wrench. Do not tighten any nut all at once. Turn top nuts in increments. Follow a star pattern cycling through each nut at least twice.

(8) Repeat (7) for leveling nuts.

(9) Replace washers above and below the base plate with galvanized beveled washers if the slope of any base plate face exceeds 1:20 (5%), any washer is not in firm contact with the base plate or any nut is not in firm contact with a washer. If any washers are replaced, repeat (7) and (8).

(10) With top and leveling nuts snug-tight, mark each top nut on a corner at the intersection of 2 flats and a corresponding reference mark on the base plate. Mark top nuts and base plate with ink or paint that is not water-soluble. Use the turn-of-nut method for pretensioning. Do not pretension any nut all at once. Turn top nuts in increments for a total turn that meets the following nut rotation requirements:

NUT ROTATION REQUIREMENTS (Turn-of-Nut Pretensioning Method)	
Anchor Rod Diameter, inch	**Requirement**
≤ 1 1/2	1/3 turn (2 flats)
> 1 1/2	1/6 turn (1 flat)

Follow a star pattern cycling through each top nut at least twice.

(11) Ensure nuts, washers and base plate are in firm contact with each other for each anchor rod. Cables, mast arms and trusses may now be attached to metal poles and upright trusses.

(12) Between 4 and 14 days after pretensioning top nuts, use a torque wrench calibrated within the last 12 months to check nuts in the presence of the Engineer. Completely erect mast arm poles and cantilever signs and attach any hardware before checking top nuts for these structures. Check that top nuts meet the following torque requirements:

TORQUE REQUIREMENTS	
Anchor Rod Diameter, inch	**Requirement, ft-lb**
7/8	180
1	270
1 1/8	380
1 1/4	420
≥ 1 1/2	600

If necessary, retighten top nuts in the presence of the Engineer with a calibrated torque wrench to within ± 10 ft-lb of the required torque. Do not overtighten top nuts.

(13) Do not grout under base plate.

Measurement and Payment

Foundations and anchor rod assemblies for metal poles and upright trusses will be measured and paid for elsewhere in the contract.

No payment will be made for temporary casings that remain in drilled pier excavations. No payment will be made for PIT. No payment will be made for further investigation of defective piers. Further investigation of piers that are not defective will be paid as extra work in accordance with Article 104-7 of the *2012 Standard Specifications*. No payment will be made for remediation of unacceptable drilled piers or post repair testing.

MATERIALS:

(2-21-12) (Rev. 1-21-14) 1000, 1005, 1024, 1050, 1056, 1074, 1078, 1080, 1081, 1086, 1084, 1087, 1092 SP10 R01

Revise the *2012 Standard Specifications* as follows:

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

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

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

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

Page 10-1, Article 1000-2, MATERIALS, line 16, add the following to the table of item references:

Item	**Section**
Type IL Blended Cement	1024-1

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.
Units	*psi*					*inch*	*inch*	*lb/cy*	*lb/cy*	*lb/cy*	*lb/cy*
AA	4,500	0.381	0.426	-	-	3.5	-	639	715	-	-
AA Slip Form	4,500	0.381	0.426	-	-	1.5	-	639	715	-	-
Drilled Pier	4,500	-	-	0.450	0.450	-	5-7 dry 7-9 wet	-	-	640	800
A	3,000	0.488	0.532	0.550	0.594	3.5	4	564	-	602	-
B	2,500	0.488	0.567	0.559	0.630	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:

TABLE 1005-1
AGGREGATE GRADATION - COARSE AGGREGATE

Std. Size #	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#40	#200	Remarks
	Percentage of Total by Weight Passing												
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 Drains
14M	-	-	-	-	-	100	35-70	5-20	-	0-8	-	A	Asphalt Plant Mix, AST, Weep Hole Drains, Str. Concrete
9	-	-	-	-	-	100	85-100	10-40	-	0-10	-	A	AST
ABC	-	100	75-97	-	55-80	-	35-55	-	25-45	-	14-30	4-12[B]	Aggregate Base Course, Aggregate Stabilization
ABC (M)	-	100	75-100	-	45-79	-	20-40	-	0-25	-	-	0-12[B]	Maintenance Stabilization
Light-weight[C]	-	-	-	-	100	80-100	5-40	0-20	-	0-10	-	0-2.5	AST

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

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

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

between 0.6% and 1.0% and for mixes that contain a reactive aggregate documented by the Department, use a pozzolan in the amount shown in Table 1024-1.

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

All fencing material and accessories shall meet Section 106.

Page 10-73, Article 1056-1 DESCRIPTION, lines 7-8, delete the first sentence of the second paragraph and replace with the following:

Use geotextile fabrics that are on the NCDOT Approved Products List.

Page 10-73, Article 1056-2 HANDLING AND STORING, line 17, replace "mechanically stabilized earth (MSE) wall faces with "temporary wall faces .

Page 10-74, TABLE 1056-1 GEOTEXTILE REQUIREMENTS, replace table with the following:

TABLE 1056-1
GEOTEXTILE REQUIREMENTS

Property	**Requirement (MARV[A])**					**Test Method**
	Type 1	**Type 2**	**Type 3[B]**	**Type 4**	**Type 5[C]**	
Typical Application	*Shoulder Drains*	*Under Rip Rap*	*Temporary Silt Fence*	*Soil Stabilization*	*Temporary Walls*	
Elongation (MD & CD)	≥ 50%	≥ 50%	≤ 25%	< 50%	< 50%	ASTM D4632
Grab Strength (MD & CD)	Table 1[D], Class 3	Table 1[D], Class 1	100 lb	Table 1[D], Class 3	-	ASTM D4632
Tear Strength (MD & CD)			-		-	ASTM D4533
Puncture Strength			-		-	ASTM D6241
Ultimate Tensile Strength (MD & CD)	-	-	-	-	2,400 lb/ft (unless required otherwise in the contract)	ASTM D4595
Permittivity	Table 2[D], 15% to 50% *in Situ* Soil Passing No. 200[E]		Table 7[D]	Table 5[D]	0.20 sec^{-1}	ASTM D4491
Apparent Opening Size					No. 30[E]	ASTM D4751
UV Stability (Retained Strength)					70%	ASTM D4355

A. MARV does not apply to elongation
B. Minimum roll width of 36" required
C. Minimum roll width of 13 ft required
D. AASHTO M 288
E. US Sieve No. per AASHTO M 92

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

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

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

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

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

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

For epoxy resin systems used for embedding dowel bars, threaded rods, rebar, anchor bolts and other fixtures in hardened concrete, the manufacturer shall submit test results showing that the bonding system will obtain 125% of the specified required yield strength of the fixture. Furnish certification that, for the particular bolt grade, diameter and embedment depth required, the anchor system will not fail by adhesive failure and that there is no movement of the anchor bolt. For certification and anchorage, use 3,000 psi as the minimum Portland cement concrete compressive strength used in this test. Use adhesives that meet Section 1081.

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

Page 10-163, Table 1081-1 Properties of Mixed Epoxy Resin Systems, replace table with the following:

Table 1081-1
Properties of Mixed Epoxy Resin Systems

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

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

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

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

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

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

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

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

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

Page 10-170, Article 1081-3 Hot Bitumen, line 9, add the following at the end of Section 1081:

1081-4 EPOXY RESIN ADHESIVE FOR BONDING TRAFFIC MARKINGS

(A) General

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

(B) Classification

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

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

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

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

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

(C) Requirements

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

(D) Prequalification

Refer to Subarticle 1081-1(E).

(E) Acceptance

Refer to Subarticle 1081-1(F).

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

Steel sheet piles detailed for permanent applications shall be hot rolled and meet ASTM A572 or ASTM A690 unless otherwise required by the plans. Steel sheet piles shall be coated as required by the plans. Galvanized sheet piles shall be coated in accordance with Section 1076. Metallized sheet piles shall be metallized in accordance to the Project Special Provision "Thermal Sprayed Coatings (Metallization) with an 8 mil, 99.9% aluminum alloy coating and a 0.5 mil seal coating. Any portion of the metallized sheet piling encased in concrete shall receive a barrier coat. The barrier coat shall be an approved waterborne coating with a low-viscosity which readily absorbs into the pores of the aluminum thermal sprayed coating. The waterborne coating shall be applied at a spreading rate that results in a theoretical 1.5 mil dry film thickness. The manufacturer shall issue a letter of certification that the resin chemistry of the waterborne coating is compatible with the 99.9% aluminum thermal sprayed alloy and suitable for tidal water applications.

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

The epoxy shall meet Article 1081-4.

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

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

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

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

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

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

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

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

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

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:

TABLE 1092-3
MINIMUM COEFFICIENT OF RETROREFLECTION FOR NC GRADE A
(Candelas Per Lux Per Square Meter)

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

SELECT MATERIAL, CLASS III, TYPE 3:
(1-17-12) 1016, 1044 SP10 R05

Revise the *2012 Standard Specifications* as follows:

Page 10-39, Article 1016-3, CLASS III, add the following after line 14:

Type 3 Select Material

Type 3 select material is a natural or manufactured fine aggregate material meeting the following gradation requirements and as described in Sections 1005 and 1006:

Percentage of Total by Weight Passing							
3/8"	#4	#8	#16	#30	#50	#100	#200
100	95-100	65-100	35-95	15-75	5-35	0-25	0-8

Page 10-39, Article 1016-3, CLASS III, line 15, replace "either type with "Type 1, Type 2 or Type 3 .

Page 10-62, Article 1044-1, line 36, delete the sentence and replace with the following:

Subdrain fine aggregate shall meet Class III select material, Type 1 or Type 3.

Page 10-63, Article 1044-2, line 2, delete the sentence and replace with the following:

Subdrain coarse aggregate shall meet Class V select material.

SHOULDER AND SLOPE BORROW:
(3-19-13) 1019 SP10 R10

Use soil in accordance with Section 1019 of the *2012 Standard Specifications*. Use soil consisting of loose, friable, sandy material with a PI greater than 6 and less than 25 and a pH ranging from 5.5 to 7.0.

Soil with a pH ranging from 4.0 to 5.5 will be accepted without further testing if additional limestone is provided in accordance with the application rates shown in Table 1019-1A. Soil type is identified during the soil analysis. Soils with a pH above 7.0 require acidic amendments to be added. Submit proposed acidic amendments to the Engineer for review and approval. Soils with a pH below 4.0 or that do not meet the PI requirements shall not be used.

TABLE 1019-1A
ADDITIONAL LIMESTONE APPLICATION RATE TO RAISE pH

pH TEST RESULT	Sandy Soils Additional Rate (lbs. / Acre)	Silt Loam Soils Additional Rate (lbs. / Acre)	Clay Loam Soils Additional Rate (lbs. / Acre)
4.0 - 4.4	1,000	4,000	6,000
4.5 - 4.9	500	3,000	5,000
5.0 - 5.4	NA	2,000	4,000

Note: Limestone application rates shown in this table are in addition to the standard rate of 4000 lbs. / acre required for seeding and mulching.

No direct payment will be made for providing additional lime or acidic amendments for Ph adjustment.

TRUCK MOUNTED CHANGEABLE MESSAGE SIGNS:
(8-21-12) 1101.02 SP11 R10

Revise the *2012 Roadway Standard Drawings* as follows:

Drawing No. 1101.02, Sheet 12, TEMPORARY LANE CLOSURES, replace General Note #11 with the following:

11- TRUCK MOUNTED CHANGEABLE MESSAGE SIGNS (TMCMS) USED ON SHADOW VEHICLES FOR "IN LANE ACTIVITIES SHALL BE A MINIMUM OF 43" X 73". THE DISPLAY PANEL SHALL HAVE FULL MATRIX CAPABILITY WITH THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

12- TMCMS USED FOR ADVANCED WARNING ON VEHICLES LOCATED ON THE SHOULDER MAY BE SMALLER THAN 43" X 73". THE DISPLAY PANEL SHALL HAVE THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE

WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

Drawing No. 1101.02, Sheet 13, TEMPORARY LANE CLOSURES, replace General Note #12 with the following:

12- TRUCK MOUNTED CHANGEABLE MESSAGE SIGNS (TMCMS) USED ON SHADOW VEHICLES FOR "IN LANE ACTIVITIES SHALL BE A MINIMUM OF 43" X 73". THE DISPLAY PANEL SHALL HAVE FULL MATRIX CAPABILITY WITH THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

13- TMCMS USED FOR ADVANCED WARNING ON VEHICLES LOCATED ON THE SHOULDER MAY BE SMALLER THAN 43" X 73". THE DISPLAY PANEL SHALL HAVE THE CAPABILITY TO PROVIDE 2 MESSAGE LINES WITH 7 CHARACTERS PER LINE WITH A MINIMUM CHARACTER HEIGHT OF 18". FOR ADDITIONAL MESSAGING, CONTACT THE WORK ZONE TRAFFIC CONTROL SECTION.

SANITARY SEWER:

(11-19-13) 1520 SP15 R20

Revise the *2012 Standard Specifications* as follows:

Page 15-11, Article 1520-3(A)(2) Testing, line 5, replace the second paragraph with the following:

Test all 24" and smaller gravity sewer lines for leakage using infiltration, exfiltration, or air test. Perform visual inspection on gravity sewer lines larger than 24". Perform line and grade testing and deflection testing on all gravity sewer lines.

PERMANENT SEEDING AND MULCHING:

(7-1-95) 1660 SP16 R02

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

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

Percentage of Elapsed Contract Time	Percentage Additive
0% - 30%	30%
30.01% - 50%	15%

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

NORTH CAROLINA PROFESSIONAL SEAL 022582 ENGINEER PAUL KI-BUN CHAN 11-1-13

PROJECT SPECIAL PROVISIONS
Rest Area Lighting

1.00 GENERAL

1.10 DESCRIPTION

Provide rest area lighting by installing post top standards with light emitting diode (LED) luminaires, roadway davit style light standard with LED luminaires, underground circuitry in conduit, junction boxes and a centralized control system.

Perform all work in accordance with these Special Provisions, the Plans, the National Electrical Code, and North Carolina Department of Transportation "Standard Specifications for Roads and Structures" (Standard Specifications).

Use Division 14 of the Standard Specifications for materials, construction methods and payment for all work, except as modified or added to by these Special Provisions. Specific sections of the Standard Specifications applicable to the work on this project are listed below:

Section 1405	Standard Foundation
Section 1409	Electrical Duct
Section 1410	Feeder Circuits
Section 1411	Electrical Junction Boxes

1.20 ELECTRICAL POWER

Electrical power will be provided through the building electrical service.

2.00 DAVIT STYLE LIGHT STANDARD

2.10 DESCRIPTION

The work covered by this section consists of furnishing and installing light standards complete with davit style arms 35 foot mounting height with breakaway bases.

2.20 MATERIALS

Provide a standard that meets the 90-mph design criteria of the AASHTO "Standard Specifications for Structural Supports for Highway Si gns, Luminaires and Traffic Signals." Provide all poles from the same manufacturer.

Provide 35 foot mounting height, tapered shaft poles with 6-foot davit arms and breakaway base.

The standard shaft shall be one piece round tapered shaft from seamless tubing. The davit arm shall be one piece round tapered that slip fits onto a tapered pole top tenon where it is fastened with stainless steel through bolts. Both shall be designed to support a luminaire with minimum

weight, projected area and center of gravity as indicated in the section of these Special Provisions titles "LED Luminaire" for the light standard luminaire.

Provide a protective grommet at the arm-to-pole connection, to protect wiring during installation and maintenance.

Provide a cast aluminum transformer base that complies with AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals." Use anchor bolts, washers, nuts and shims which comply with the Specifications and details shown in the plans. Use connecting bolts as recommended by the light standard and transformer base manufacturer(s).

The shaft and the davit arm shall be 6063 aluminum alloy tubing. The finish shall be smooth and shall be free of scratches or dents and shall have suitable protection for handling during erection.

Pole hardware, nuts, bolts, and washers, etc. shall be made from 18-8 stainless steel, or steel conforming to ASTM A307 galvanized in accordance with ASTM A153.

Drawings submitted for approval shall show material specifications for each component and shall have a certification statement concerning conformance with AASHTO design criteria.

2.30 CONSTRUCTION METHODS

Lay out and identify light standards as shown on the plans. Adjust final location as per direction of the Engineer to avoid conflicts with other objects. Protect the shaft during storage and installation to ensure against scratches or dents. Use proper blocking and protection to prevent warping or discoloration when laid on the ground, and to prevent damage by other construction work.

Install standards vertically plumb, and use connecting bolts, washers and nuts compatible with the transformer base as recommended by the light standard manufacturer and which comply with the contract. Provide the required luminaire mounting height which is defined as vertical distance from luminaire to pavement surface.

2.40 MEASUREMENT AND PAYMENT

The quantity of light standards to be paid for will be the actual number of light standards with davit style arms and transformer bases that have been installed and accepted.

The quantity of light standards measured as provided above will be paid for at the contract unit price each for "Davit Style Light Standard, MH 35', SA 6'" of the appropriate type. Such price and payment will be full compensation for all work of furnishing and installing the standard with davit style arm and transformer base.

Payment will be made under:

Davit Style Light Standard, MH 35', SA 6' ..... Each

3.00 POST TOP STANDARDS

3.10 DESCRIPTION

The work covered by this section consists of furnishing and installing post top light standards with contemporary style post top luminaires and breakaway base.

3.20 MATERIALS

Provide a 6063 aluminum alloy round tubing post top light standard that meets the 100-mph design criteria of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals."

The pole shall be sized to provide a nominal luminaire mounting height of 15 ft. when adding transformer base height. The pole shall have a 2" pipe size top mounted tenon (2 ⅜" O.D. x 4 ½" minimum length) for mounting the luminaire.

Use pole hardware, nuts, bolts, and washers, etc. made from 18-8 stainless steel, aluminum alloy 2024-T4, or steel conforming to ASTM A307 and galvanized in accordance with ASTM A 153.

Drawings submitted for approval shall show material specifications, dimensions and shall have a certification statement concerning conformance with AASHTO design criteria. Only reviewed and approved materials will be used.

Provide a cast aluminum transformer base for each post top light standard that complies with AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals." Use anchor bolts, washers, nuts and shims which comply with the Specifications and details shown in the plans. Use connecting bolts as recommended by the post top light standard and transformer base manufacturer(s).

3.30 CONSTRUCTION METHODS

Identify light standards as shown on the plans. Use scaled dimensions to locate light standards. Adjust final location as per direction of the engineer to avoid conflicts with other objects. Protect the shaft during storage and installation to ensure against scratches or dents. Use proper blocking and protection to prevent warping or discoloration when laid on the ground, and to prevent damage by other construction work.

Install all standards vertically plumb, and provide the required luminaire mounting height.

3.40 MEASUREMENT AND PAYMENT

The quantity of post top standards to be paid for will be the actual number that have been installed and accepted.

The quantity of post top standards measured as provided above will be paid for at the contract unit price each for "Post Top Light Standard" of the appropriate type. Such price and payment will be full compensation for all work of furnishing and installing the standard and the breakaway base.

Payment will be made under:

Post Top Light Standard ..... Each

4.00 LIGHT CONTROL SYSTEM

4.10 DESCRIPTION

The work covered by this section includes the furnishing and installing of all materials necessary to provide a wall mounted lighting control system in a rest area service building as shown on the plans.

4.20 MATERIALS

Provide a 5/8" thick Exterior Grade AD plywood back panel slightly larger than the layout of the control system components.

Provide a 6" x 6" x 4' wire trough. The wire trough shall be long enough to accommodate all components and connections. The trough shall be constructed of formed and welded steel that is painted or galvanized, with one removable side plate that is secured in place with corrosion resistant screws, and has only the holes necessary for the conduits shown in the plans. Wire trough with knockouts is not acceptable.

Provide a lighting panel consisting of a surface mount load center, with copper bus, factory installed main breaker, 22,000 Amps short circuit current rating sized as shown in the plans, a minimum of 16 single-pole branch breaker spaces and an equipment ground bar. Use double-pole branch breakers with 10,000 Amps short circuit current rating sized as shown in the plans.

Provide electrically operated, mechanically held contactors with coil clearing contacts. Ensure latching without the use of hooks or semi-permanent magnets. Use contactors rated 240 VAC, 30 amps, with 120 VAC coils and 4 poles each.

Provide a control relay rated 600 VAC, with one normally open contact, one normally closed contact, and "continuous load" rating and "inductive make and break" rating greater than that required by the mechanically held contactors. Install control relay in a NEMA 1 enclosure.

Use a control selector switch rated standard duty, with three positions, and maintained contacts, in a surface mount NEMA 1 enclosure. Provide contacts with an inductive rating of 5 amps continuous, 3600 VA make, and 3600 VA break. Provide a legend plate that indicates "On-Off-Auto".

Use a "dual voltage" photocontrol with surge protection and single pole, single throw, contact with a minimum contact rating of 1000 watts. Provide a normally closed contact that is "daylight energized," with a turn on range of approximately 3 footcandles. Mount the photocontrol in a three-prong locking type receptacle, conforming to NEMA Standard C136.10.

Use number 8 AWG type THHN stranded copper conductors on the line side of the mechanically held contactors, and number 12 AWG stranded copper conductors for the control circuit, conforming to the requirements of Article 1400-2C of the Standard Specifications titled "Wire". Size all other conductors as shown in the plans.

Use rigid galvanized steel conduit in accordance with Article 1400-2B of the Standard Specifications titled "Conduit".

4.30 CONSTRUCTION METHODS

Use the plywood panel for mounting components on all walls other than masonry. Arrange the components as shown on the equipment layout detail in the plans.

Install conductors and conduit in accordance with Articles 1400-4F of the Standard Specifications titled "Wiring Methods" and 1400-4E "Conduit Installation". Clearly identify the phase, neutral, and contact conductors for the photocontrol in the wire trough.

Install flashing around the conduit extended through the roof to the photo control.

Securely fasten each component to the wall or panel with corrosion resistant bolts and inserts. Utilize all mounting holes in each component. Install a galvanized washer between the component and masonry walls to assure a minimum of ¼" air space.

Paint the plywood panel the same color as the wall. After the control system components are installed, clean, prime, and paint all exposed surfaces of enclosures and conduit with a premium quality paint that best matches the color of the adjacent walls. Mask all legend plates, nameplates, etc. while painting.

4.40 MEASUREMENT AND PAYMENT

The quantity of light control systems to be paid for will be the actual number of light control systems that have been installed and accepted.

The quantity of light control systems, measured as provided above, will be paid for at the contract unit price each for "Light Control Equipment, Type RA 120/240V" of the appropriate type. Such price and payment will be full compensation for all work of furnishing and installing

an entire control system, including mounting panel, control circuit, photocontrol, contactors, breakers, and selector switch.

Payment will be made under:

Light Control Equipment, Type RA 120/240V ..... Each

5.00 STANDARD FOUNDATION TYPE R1S

5.10 DESCRIPTION

Work covered by this section shall be in conformance with Section 1405 of the Standard Specifications except as modified below.

5.20 MATERIALS

Same as Standard Specifications Section 1405-2

5.30 CONSTRUCTION METHODS

Light standard foundation type R1S for post top lights shall be equal to type R1 on standard drawing 1405.01 except as stated below.

The type R1S foundation shall be 24" diameter by 48" deep.

Anchor bolts supplied by the post top light manufacturer shall be cast into the concrete base and positioned per the manufacturer's template.

5.40 MEASUREMENT AND PAYMENT

Same as Standard Specifications Section 1405-4

6.00 LED LUMINAIRES

6.10 DESCRIPTION

The work covered by this section consists of furnishing and installing LED roadway and post top luminaires on new metal single arm and post top light standards described in previous sections if these Special Provisions. Mounting height for roadway standards is 35'. Mounting height for post top standards is 15'.

For LED roadway luminaires installed on the davit arm of single arm standards, Contractor shall include all LEDs/light bars, drivers, wiring inside the standard from the circuit conductors to the LED luminaire, in-line breakaway fuseholders with fuses and ground wiring at the pole on the light standards. Third party certified photometric files in IES format are required to be submitted

with the catalog cuts for the proposed LED roadway luminaire. Photometric files must show that proposed luminaire will meet or exceed the design shown in the plans.

6.20 MATERIALS

The Contractor shall supply luminaires conforming to the standards below.

The LED post top luminaire shall have a contemporary look such as the Cree THE EDGE Area Round or the Visionaire California Aria LED. This is not meant as a specification for these luminaires. These manufacturers and models are provided for reference only.

6.21 LUMINAIRE REQUIREMENTS

Unless otherwise stated, the requirements below apply to both the Roadway LED luminaire and the Post Top LED luminaire.

A. General Requirements
- LM-79 photometric test reports shall be provided for LED luminaires. LM-79 luminaire photometric reports shall be produced by an independent test laboratory and include the following:
  - Name of test laboratory. The test laboratory must hold National Voluntary Laboratory Accreditation Program (NVLAP) accreditation for the IES LM-79 test procedure or must be qualified, verified, and recognized through the U.S. Department of Energy's CALiPER program.
  - Report number
  - Date
  - Complete luminaire catalog number. Catalog number tested must match the catalog number of the luminaire submitted, except for variations which do not affect performance.
  - Description of luminaire, LED light source(s), and LED driver(s)
  - Goniophotometry
  - Colorimetry

- LM-80 lumen maintenance test report shall be provided for LED light source.
- The luminaire shall be constructed of a single piece die cast aluminum housing and finished gray in color unless otherwise noted.
- Luminaire shall have a minimum L70 rating of 70,000 hours at 25°C. Provide a summary of reliability testing performed for LED driver.
- Roadway and post top luminaires shall have a maximum total power consumption of 150W and 70W, respectively, at 240VAC. Nominal luminaire input wattage shall account for nominal applied voltage and any reduction in driver efficiency due to sub-optimal driver loading.
- Roadway luminaire shall have an IESNA distribution Type III. Post top luminaire shall have an IESNA distribution Type V.
- Luminaires shall meet dust and moisture rating of IP-65, minimum.

- Roadway luminaire shall have an external label per ANSI C136.15
- Luminaires shall have an internal label per ANSI C136.22.
- Luminaires shall start and operate in -20°C to +40°C ambient.
- Electrically test fully assembled luminaires before shipment from factory.
- Effective Projected Area (EPA) and weight of the roadway luminaire shall not exceed 0.75 square feet and 30 lbs., respectively.
- Luminaires shall be designed for ease of electrical component replacement.
- Luminaires shall be rated for minimum 2G vibration per ANSI C136.31-2010
- LED light sources and drivers shall be RoHS compliant.
- Transmissive optical components shall be applied in accordance with OEM design guidelines to ensure suitability for the thermal/mechanical/chemical environment.
- The luminaire manufacturer shall have no less than five (5) years of experience in manufacturing LED-based lighting products and the manufacturing facility must be ISO 9001 certified. Proof of certification shall be provided at the request of the Department.
- Roadway luminaire shall have a 1.625" to 2.375" adjustable tenon mount for connection to luminaire arm assembly.
- Pole hardware, nuts, bolts, and washers, etc. shall be made from 18-8 stainless steel, or steel conforming to ASTM A307 galvanized in accordance with ASTM A153.

B. Driver
- Rated case temperature shall be suitable for operation in the luminaire operating in the ambient temperature range of -20°C to +40°C.
- Shall be configured to operate at 240 VAC at 50/60 Hz, and shall operate normally for input voltage fluctuations of ± 10%.
- Shall have a minimum Power Factor (PF) of 0.90 at full input power and across specified voltage range.
- Roadway luminaire shall have maximum 600mA driver operating current. Post top luminaire shall have a maximum 350mA driver operating current.

C. Surge Suppression
- Integral surge protection shall meet ANSI/IEEE C62.45 procedures based on ANSI/IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High 10kV/10kA test, IEC 61000-4-2 (Electrostatic Discharge) 8kV Air/4kV Contact test and IEC 61000-4-4 (Fast Transients).

D. Electromagnetic interference
- Luminaire shall have a maximum Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.
- Luminaire shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.

E. Electrical safety testing

- Luminaire shall be listed for wet locations.
- Luminaire shall be UL listed and labeled.

F. Finish
- Luminaire shall be painted with a corrosion resistant polyester powdered paint with a minimum 2.0 mil thickness.
- Shall exceed a rating of six per ASTM D1654 after 1000 hours of salt spray fog testing per ASTM B117.
- The coating shall exhibit no greater than 30% reduction of gloss per ASTM D523, after 500 hours of QUV testing at ASTM G154 Cycle 6.

G. Thermal management
- Mechanical design of protruding external surfaces (heat sink fins) shall facilitate hose-down cleaning and discourage debris accumulation.

H. Color Quality
- Minimum Color Rendering Index (CRI) of 60 with a Correlated Color Temperature (CCT) of 4000K to 5000K

I. The following shall be in accordance with corresponding sections of ANSI C136.37
- All internal components shall be assembled and pre-wired using modular electrical connections.
- Terminal blocks shall be used for incoming AC lines
- Latching and hinging

J. Manufacturer or local sales representative shall provide installation and troubleshooting support via telephone and/or email.

6.30 WARRANTY

Provide a minimum five-year "no questions asked" warranty covering maintained integrity and functionality of the luminaire housing, wiring, and connections, LED light source(s) and LED driver. Negligible light output from more than 10 percent of the LED packages constitutes luminaire failure.

Warranty period shall begin 90 days after project completion.

6.40 CONSTRUCTION METHODS

Mount luminaires securely to the tenon and connect to the feeder circuit via a pair of fuse holders, accessible in the breakaway transformer base of the standard, in conformance with the plans, other sections of these Special Provisions and the Standard Specifications.

Level luminaires using leveling pads on the luminaire enclosure. Adjust any luminaires, as directed by the Engineer, to give optimum illumination distribution.

6.50 MEASUREMENT AND PAYMENT

The quantity of roadway and post top luminaires to be paid for will be the actual number of roadway and post top LED luminaires which have been installed and accepted.

The quantity of Post Top LED luminaires, measured as provided above, will be paid for at the contract unit price each for "Post Top Luminaires, LED, Type V" of the appropriate type and style. Such price and payment will be full compensation for all work of furnishing and installing the luminaire, wiring inside the standard from circuit conductors to luminaire, in-line breakaway fuses and ground wiring at the pole.

The quantity of Roadway LED luminaires, measured as provided above, will be paid for at the contract unit price each for "Roadway Luminaires, LED, Type III" of the appropriate type and style. Such price and payment will be full compensation for all work of furnishing and installing the luminaire, wiring inside the standard from circuit conductors to luminaire, in-line breakaway fuses and ground wiring at the pole.

Payment will be made under:

Post Top Luminaires, LED, Type V	Each
Roadway Luminaires, LED, Type III	Each

7.00 ELECTRICAL JUNCTION BOXES

7.10 DESCRIPTION

Same as Section 1411-1.

7.20 MATERIALS

Same as Section 1411-2, except modify referenced Section 1091-5 as follows:

- Page 10-202, revise paragraph starting on line 9 to read "Provide polymer concrete (PC) boxes which have bolted covers and open bottoms. Provide vertical extensions of 6" to 12" as required by project special provisions."
- Page 10-202, revise sentence beginning on line 14 to read "Other thermoplastic materials may be used for components which are not normally exposed to sunlight."

7.30 CONSTRUCTION METHODS

Same as Section 1411-3.

7.40 MEASUREMENT AND PAYMENT

Same as Section 1411-4.

PROJECT SPECIAL PROVISIONS
Utilities by Others

General:

The following utility companies have facilities that will be in conflict with the construction of this project:

A. AT&T – Telephone
B. Duke Energy – Distribution Power
C. Microelectronics Center of North Carolina (MCNC) – Broadband

The conflicting facilities of these concerns will be adjusted prior to the date of availability, unless otherwise noted and are therefore listed in these special provisions for the benefit of the Contractor. All utility work listed herein will be done by the utility owners. All utilities are shown on the plans from the best available information.

The Contractor's attention is directed to Article 105.8 of the 2012 Standard Specifications.

Utilities Requiring Adjustment:

A. AT&T – Telephone

1. AT&T will abandon, adjust, relocate or remove its facilities within the project limits as shown on the Utilities by Others Plans.
2 Contact person for AT&T is Mr. Scott Addington at 828-258-7138.

B. Duke Energy – Distribution Power

1. Duke Energy will abandon, adjust, relocate or remove its facilities at the locations within the project limits as shown on the Utilities by Others Plans.
2. Contact person for Duke Energy is Mr. Tony Shive at 919-882-5028.

C. Microelectronics Center of North Carolina (MCNC) – Broadband

1. MCNC will adjust, relocate or remove its facilities at the locations within the project limits as shown on the Utilities by Others Plans.
2. Contact person for MCNC is Mr. Grey Daughtrey at 919-819-4739 (cell).

Project Special Provisions
Erosion Control

STABILIZATION REQUIREMENTS:

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

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

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

SEEDING AND MULCHING: (WestEd)

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

Shoulder and Median Areas

August 1 - June 1		**May 1 - September 1**	
20#	Kentucky Bluegrass	20#	Kentucky Bluegrass
75#	Hard Fescue	75#	Hard Fescue
25#	Rye Grain	10#	German or Browntop Millet
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Areas Beyond the Mowing Pattern, Waste and Borrow Areas:

August 1 - June 1		**May 1 - September 1**	
100#	Tall Fescue	100#	Tall Fescue
15#	Kentucky Bluegrass	15#	Kentucky Bluegrass
30#	Hard Fescue	30#	Hard Fescue
25#	Rye Grain	10#	German or Browntop Millet
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Approved Tall Fescue Cultivars

2nd Millennium	Duster	Magellan	Rendition
Avenger	Endeavor	Masterpiece	Scorpion
Barlexas	Escalade	Matador	Shelby
Barlexas II	Falcon II, III, IV & V	Matador GT	Signia
Barrera	Fidelity	Millennium	Silverstar
Barrington	Finesse II	Montauk	Southern Choice II
Biltmore	Firebird	Mustang 3	Stetson
Bingo	Focus	Olympic Gold	Tarheel
Bravo	Grande II	Padre	Titan Ltd
Cayenne	Greenkeeper	Paraiso	Titanium
Chapel Hill	Greystone	Picasso	Tomahawk
Chesapeake	Inferno	Piedmont	Tacer
Constitution	Justice	Pure Gold	Trooper
Chipper	Jaguar 3	Prospect	Turbo
Coronado	Kalahari	Quest	Ultimate
Coyote	Kentucky 31	Rebel Exeda	Watchdog
Davinci	Kitty Hawk	Rebel Sentry	Wolfpack
Dynasty	Kitty Hawk 2000	Regiment II	
Dominion	Lexington	Rembrandt	

Approved Kentucky Bluegrass Cultivars:

Alpine	Bariris	Envicta	Rugby
Apollo	Bedazzled	Impact	Rugby II
Arcadia	Bordeaux	Kenblue	Showcase
Arrow	Champagne	Midnight	Sonoma
Award	Chicago II	Midnight II	

Approved Hard Fescue Cultivars:

Chariot	Nordic	Rhino	Warwick
Firefly	Oxford	Scaldis II	
Heron	Reliant II	Spartan II	
Minotaur	Reliant IV	Stonehenge	

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

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

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

Native Grass Seeding And Mulching **(West)**

Native Grass Seeding and Mulching shall be performed on the disturbed areas of wetlands and riparian areas, and adjacent to Stream Relocation and/or trout stream construction within a 50 foot zone on both sides of the stream or depression, measured from top of stream bank or center of depression. The stream bank of the stream relocation shall be seeded by a method that does not alter the typical cross section of the stream bank. Native Grass Seeding and Mulching shall also be performed in the permanent soil reinforcement mat section of preformed scour holes, and in other areas as directed.

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

August 1 - June 1		**May 1 – September 1**	
25#	Virginia Wild Rye	25#	Virginia Wild Rye
8#	Big Bluestem	8#	Big Bluestem
6#	Indiangrass	6#	Indiangrass
4#	Switchgrass	4#	Switchgrass
35#	Rye Grain	25#	German or Browntop Millet
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

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

Native Grass Seeding and Mulching shall be performed in accordance with Section 1660 of the *Standard Specifications* and vegetative cover sufficient to restrain erosion shall be installed immediately following grade establishment.

Measurement and Payment

Native Grass *Seeding and Mulching* will be measured and paid for in accordance with Article 1660-8 of the *Standard Specifications*.

TEMPORARY SEEDING:

Fertilizer shall be the same analysis as specified for *Seeding and Mulching* and applied at the rate of 400 pounds and seeded at the rate of 50 pounds per acre. German Millet, or Browntop Millet shall be used in summer months and rye grain during the remainder of the year. The Engineer will determine the exact dates for using each kind of seed.

FERTILIZER TOPDRESSING:

Fertilizer used for topdressing shall be 16-8-8 grade and shall be applied at the rate of 500 pounds per acre. A different analysis of fertilizer may be used provided the 2-1-1 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as 16-8-8 analysis and as directed.

SUPPLEMENTAL SEEDING:

The kinds of seed and proportions shall be the same as specified for *Seeding and Mulching*, and the rate of application may vary from 25# to 75# per acre. The actual rate per acre will be determined prior to the time of topdressing and the Contractor will be notified in writing of the rate per acre, total quantity needed, and areas on which to apply the supplemental seed. Minimum tillage equipment, consisting of a sod seeder shall be used for incorporating seed into the soil as to prevent disturbance of existing vegetation. A clodbuster (ball and chain) may be used where degree of slope prevents the use of a sod seeder.

MOWING:

The minimum mowing height on this project shall be six inches.

REFORESTATION:

Description

Reforestation will be planted within interchanges and along the outside borders of the road, and in other areas as directed. *Reforestation* is not shown on the plan sheets. See the Reforestation Detail Sheet.

All non-maintained riparian buffers impacted by the placement of temporary fill or clearing activities shall be restored to the preconstruction contours and revegetated with native woody species.

The entire *Reforestation* operation shall comply with the requirements of Section 1670 of the *Standard Specifications*.

Materials

Reforestation shall be bare root seedlings 12"-18" tall.

Construction Methods

Reforestation shall be shall be planted as soon as practical following permanent S*eeding and Mulching*. The seedlings shall be planted in a 16-foot wide swath adjacent to mowing pattern line, or as directed.

Root dip: The roots of reforestation seedlings shall be coated with a slurry of water, and either a fine clay (kaolin) or a superabsorbent that is designated as a bare root dip. The type, mixture ratio, method of application, and the time of application shall be submitted to the Engineer for approval.

With the approval of the Engineer, seedlings may be coated before delivery to the job or at the time of planting, but at no time shall the roots of the seedlings be allowed to dry out. The roots shall be moistened immediately prior to planting.

Seasonal Limitations: *Reforestation* shall be planted from November 15 through March 15.

Measurement and Payment

Reforestation will be measured and paid for in accordance with Article 1670-17 of the *Standard Specifications*.

RESPONSE FOR EROSION CONTROL:

Description

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

Section	Erosion Control Item	Unit
1605	Temporary Silt Fence	LF
1606	Special Sediment Control Fence	LF/TON
1615	Temporary Mulching	ACR
1620	Seed - Temporary Seeding	LB
1620	Fertilizer - Temporary Seeding	TN
1631	Matting for Erosion Control	SY
SP	Coir Fiber Mat	SY
1640	Coir Fiber Baffles	LF
SP	Permanent Soil Reinforcement Mat	SY
1660	Seeding and Mulching	ACR

1661	Seed - Repair Seeding	LB
1661	Fertilizer - Repair Seeding	TON
1662	Seed - Supplemental Seeding	LB
1665	Fertilizer Topdressing	TON
SP	Safety/Highly Visible Fencing	LF
SP	Response for Erosion Control	EA

Construction Methods

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

Measurement and Payment

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

Payment will be made under:

Pay Item	**Pay Unit**
Response for Erosion Control	Each

ENVIRONMENTALLY SENSITIVE AREAS:

Description

This project is located in an *Environmentally Sensitive Area.* This designation requires special procedures to be used for clearing and grubbing, temporary stream crossings, and grading operations within the Environmentally Sensitive Areas identified on the plans and as designated by the Engineer. This also requires special procedures to be used for seeding and mulching and staged seeding within the project.

The Environmentally Sensitive Area shall be defined as a 50-foot buffer zone on both sides of the stream or depression measured from top of streambank or center of depression.

Construction Methods

(A) Clearing and Grubbing

In areas identified as Environmentally Sensitive Areas, the Contractor may perform clearing operations, but not grubbing operations until immediately prior to beginning grading operations as described in Article 200-1 of the *Standard Specifications*. Only clearing operations (not grubbing) shall be allowed in this buffer zone until immediately prior to beginning grading operations. Erosion control devices shall be installed immediately following the clearing operation.

(B) Grading

Once grading operations begin in identified Environmentally Sensitive Areas, work shall progress in a continuous manner until complete. All construction within these areas shall progress in a continuous manner such that each phase is complete and areas are permanently stabilized prior to beginning of next phase. Failure on the part of the Contractor to complete any phase of construction in a continuous manner in Environmentally Sensitive Areas will be just cause for the Engineer to direct the suspension of work in accordance with Article 108-7 of the *Standard Specifications*.

(C) Temporary Stream Crossings

Any crossing of streams within the limits of this project shall be accomplished in accordance with the requirements of Subarticle 107-13(B) of the *Standard Specifications*.

(D) Seeding and Mulching

Seeding and mulching shall be performed in accordance with Section 1660 of the *Standard Specifications* and vegetative cover sufficient to restrain erosion shall be installed immediately following grade establishment.

Seeding and mulching shall be performed on the areas disturbed by construction immediately following final grade establishment. No appreciable time shall lapse into the contract time without stabilization of slopes, ditches and other areas within the Environmentally Sensitive Areas.

(E) Stage Seeding

The work covered by this section shall consist of the establishment of a vegetative cover on cut and fill slopes as grading progresses. Seeding and mulching shall be done in stages on cut and fill slopes that are greater than 20 feet in height measured along the slope, or greater than 2 acres in area. Each stage shall not exceed the limits stated above.

Additional payments will not be made for the requirements of this section, as the cost for this work shall be included in the contract unit prices for the work involved.

MINIMIZE REMOVAL OF VEGETATION:

The Contractor shall minimize removal of vegetation at stream banks and disturbed areas within the project limits as directed.

STOCKPILE AREAS:

The Contractor shall install and maintain erosion control devices sufficient to contain sediment around any erodible material stockpile areas as directed.

ACCESS AND HAUL ROADS:

At the end of each working day, the Contractor shall install or re-establish temporary diversions or earth berms across access/haul roads to direct runoff into sediment devices. Silt fence sections that are temporarily removed shall be reinstalled across access/haul roads at the end of each working day.

WASTE AND BORROW SOURCES:

Payment for temporary erosion control measures, except those made necessary by the Contractor's own negligence or for his own convenience, will be paid for at the appropriate contract unit price for the devices or measures utilized in borrow sources and waste areas.

No additional payment will be made for erosion control devices or permanent seeding and mulching in any commercial borrow or waste pit. All erosion and sediment control practices that may be required on a commercial borrow or waste site will be done at the Contractor's expense.

All offsite Staging Areas, Borrow and Waste sites shall be in accordance with "Borrow and Waste Site Reclamation Procedures for Contracted Projects" located at:

http://www.ncdot.gov/doh/operations/dp_chief_eng/roadside/fieldops/downloads/Files/ContractedReclamationProcedures.pdf

All forms and documents referenced in the "Borrow and Waste Site Reclamation Procedures for Contracted Projects" shall be included with the reclamation plans for offsite staging areas, and borrow and waste sites.

TEMPORARY DIVERSION:

This work consists of installation, maintenance, and cleanout of *Temporary Diversions* in accordance with Section 1630 of the *Standard Specifications*. The quantity of excavation for installation and cleanout will be measured and paid for as *Silt Excavation* in accordance with Article 1630-4 of the *Standard Specifications*.

SAFETY FENCE AND JURISDICTIONAL FLAGGING:

Description

Safety Fence shall consist of furnishing materials, installing and maintaining polyethylene or polypropylene fence along the outside riparian buffer, wetland, or water boundary, or other boundaries located within the construction corridor to mark the areas that have been approved to infringe within the buffer, wetland, endangered vegetation, culturally sensitive areas or water. The fence shall be installed prior to any land disturbing activities.

Interior boundaries for jurisdictional areas noted above shall be delineated by stakes and highly visible flagging.

Jurisdictional boundaries at staging areas, waste sites, or borrow pits, whether considered outside or interior boundaries shall be delineated by stakes and highly visible flagging.

Materials

(A) Safety Fencing

Polyethylene or polypropylene fence shall be a highly visible preconstructed safety fence approved by the Engineer. The fence material shall have an ultraviolet coating.

Either wood posts or steel posts may be used. Wood posts shall be hardwood with a wedge or pencil tip at one end, and shall be at least 5 ft. in length with a minimum nominal 2" x 2" cross section. Steel posts shall be at least 5 ft. in length, and have a minimum weight of 0.85 lb/ft of length.

(B) Boundary Flagging

Wooden stakes shall be 4 feet in length with a minimum nominal 3/4" x 1-3/4" cross section. The flagging shall be at least 1" in width. The flagging material shall be vinyl and shall be orange in color and highly visible.

Construction Methods

No additional clearing and grubbing is anticipated for the installation of this fence. The fence shall be erected to conform to the general contour of the ground.

(A) Safety Fencing

Posts shall be set at a maximum spacing of 10 ft., maintained in a vertical position and hand set or set with a post driver. If hand set, all backfill material shall be thoroughly tamped. Wood posts may be sharpened to a dull point if power driven. Posts damaged by power driving shall be removed and replaced prior to final acceptance. The tops of all wood posts shall be cut at a 30-

degree angle. The wood posts may, at the option of the Contractor, be cut at this angle either before or after the posts are erected.

The fence geotextile shall be attached to the wood posts with one 2" galvanized wire staple across each cable or to the steel posts with wire or other acceptable means.

Place construction stakes to establish the location of the safety fence in accordance with Article 105-9 or Article 801-1 of the *Standard Specifications.* No direct pay will be made for the staking of the safety fence. All stakeouts for safety fence shall be considered incidental to the work being paid for as "Construction Surveying", except that where there is no pay item for construction surveying, all safety fence stakeout will be performed by state forces.

Safety Fence shall be placed in the locations noted on the Clearing and Grubbing phase of the erosion control plans noted as "15 FT. UNDISTURBED BUFFER ZONE LINE INSTALL SAFETY FENCE" and as directed.

The Contractor shall be required to maintain the safety fence in a satisfactory condition for the duration of the project as determined by the Engineer.

(B) Boundary Flagging

Boundary flagging delineation of interior boundaries shall consist of wooden stakes on 25 feet maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 6" into the ground. Interior boundaries may be staked on a tangent that runs parallel to buffer but must not encroach on the buffer at any location. Interior boundaries of hand clearing shall be identified with a different colored flagging to distinguish it from mechanized clearing.

Boundary flagging delineation of interior boundaries will be placed in accordance with Article 105-9 or Article 801-1 of the *Standard Specifications*. No direct pay will be made for delineation of the interior boundaries. This delineation will be considered incidental to the work being paid for as *Construction Surveying,* except that where there is no pay item or construction surveying the cost of boundary flagging delineation shall be included in the unit prices bid for the various items in the contract. Installation for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall consist of wooden stakes on 25 feet maximum intervals with highly visible orange flagging attached. Stakes shall be installed a minimum of 6" into the ground. Additional flagging may be placed on overhanging vegetation to enhance visibility but does not substitute for installation of stakes.

Installation of boundary flagging for delineation of all jurisdictional boundaries at staging areas, waste sites, or borrow pits shall be performed in accordance with Subarticle 230-4(B)(3)(d) or Subarticle 802-2(F) of the *Standard Specifications*. No direct pay will be made for this delineation, as the cost of same shall be included in the unit prices bid for the various items in the contract.

The Contractor shall be required to maintain alternative stakes and highly visible flagging in a satisfactory condition for the duration of the project as determined by the Engineer.

Measurement and Payment

Safety Fence will be measured and paid as the actual number of linear feet of polyethylene or polypropylene fence installed in place and accepted. Such payment will be full compensation including but not limited to furnishing and installing fence geotextile with necessary posts and post bracing, staples, tie wires, tools, equipment and incidentals necessary to complete this work.

Payment will be made under:

Pay Item	Pay Unit
Safety Fence	Linear Foot

SKIMMER BASIN WITH BAFFLES:

Description

Provide a skimmer basin to remove sediment from construction site runoff at locations shown in the erosion control plans. See the Skimmer Basin with Baffles Detail sheet provided in the erosion control plans. Work includes constructing sediment basin, installation of temporary slope drain pipe and coir fiber baffles, furnishing, installation and cleanout of skimmer, providing and placing stone pad on bottom of basin underneath skimmer device, providing and placing a geotextile spillway liner, providing coir fiber mat stabilization for the skimmer outlet, disposing of excess materials, removing temporary slope drain, coir fiber baffles, geotextile liner and skimmer device, backfilling basin area with suitable material and providing proper drainage when basin area is abandoned.

Materials

Item	Section
Stone for Erosion Control, Class B	1042
Geotextile for Soil Stabilization, Type 4	1056
Fertilizer for Temporary Seeding	1060-2
Seed for Temporary Seeding	1060-4
Seeding and Mulching	1060-4
Matting for Erosion Control	1060-8
Staples	1060-8
Coir Fiber Mat	1060-14
Temporary Slope Drain	1622-2
Coir Fiber Baffle	1640

Provide appropriately sized and approved skimmer device.

Provide Schedule 40 PVC pipe with a length of 6 ft. to attach to the skimmer and the coupling connection to serve as the arm pipe. For skimmer sizes of 2.5 in. and smaller, the arm pipe diameter shall be 1.5 inches. For skimmer sizes of 3 in. and larger, refer to manufacturer recommendation.
Provide 4" diameter Schedule 40 PVC pipe to attach to coupling connection of skimmer to serve as the barrel pipe through the earthen dam.

Anchors: Staples, stakes, or reinforcement bars shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes 12"- 24" long with a 2" x 2" nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 1"- 2" long head at the top with a 1"- 2" notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 24" nominal length. The bars shall have a 4" diameter bend at one end with a 4" straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Construction Methods

Excavate basin according to the erosion control plans with basin surface free of obstructions, debris, and pockets of low-density material. Install temporary slope drain pipe and construct the primary spillway according to the Skimmer Basin with Baffles Detail sheet in the erosion control plans. Temporary slope drain pipe at inlet of basin may be replaced by geotextile as directed. Construct the coir fiber baffles according to *Roadway Standard Drawings* No. 1640.01 and Section 1640 of the *Standard Specifications*.

Install skimmer device according to manufacturer recommendations. Install 4" Schedule 40 PVC pipe into dam on the lower side of basin 1 ft. from the bottom of the basin and according to the detail, and extend the pipe so the basin will drain. Attach a 6 ft. arm pipe to the coupling connection and skimmer according to manufacturer recommendations. Attach the rope included with the skimmer to the tee between the vent socket and the tube inlet, and the other end to a wooden stake or metal post. Clean out skimmer device when it becomes clogged with sediment and/or debris and is unable to float at the top of water in skimmer basin. Take appropriate measures to avoid ice accumulation in the skimmer device. Construct a stone pad of Class B stone directly underneath the skimmer device at bottom of basin. The pad shall be a minimum of 12" in height, and shall have a minimum cross sectional area of 4 ft. by 4 ft.

Line primary spillway with geotextile unrolled in the direction of flow and lay smoothly but loosely on soil surface without creases. Bury edges of geotextile in a trench at least 5" deep and tamp firmly. If geotextile for the primary spillway is not one continuous piece of material, make horizontal overlaps a minimum of 18" with upstream geotextile overlapping the downstream geotextile. Secure geotextile with eleven gauge wire staples shaped into a *u* shape with a length of not less than 12" and a throat not less than 1" in width. Place staples along outer edges and throughout the geotextile a maximum of 3 ft. horizontally and vertically. Geotextile shall be placed to the bottom and across the entire width of the basin according to the Skimmer Basin with Baffles detail. Place sealant inside basin around barrel pipe on top of geotextile with a minimum width of 6 in.

At the skimmer outlet, provide a smooth soil surface free from stones, clods, or debris that will prevent contact of the coir fiber matting with the soil. Unroll the matting and apply without stretching such that it will lie smoothly but loosely on the soil surface. Wooden stakes, reinforcement bars, or staples may be used as anchors in accordance with the details in the plans and as directed. Place anchors across the matting at the ends approximately 1 ft. apart. Place anchors along the outer edges and down the center of the matting 3 ft. apart.

All bare side slope sections of the skimmer basin shall be seeded with a temporary or permanent seed mix as directed and in accordance with Articles 1620-3, 1620-4, 1620-5, 1660-4, 1660-5 and 1660-7 of the *Standard Specifications*. Straw or excelsior matting shall be installed on all bare side slope sections immediately upon the completion of seeding and in accordance with Article 1631-3 of the *Standard Specifications*.

Measurement and Payment

Silt Excavation will be measured and paid for in accordance with Article 1630-4 of the *Standard Specifications*, as calculated from the typical section throughout the length of the basin as shown on the final approved plans.

Geotextile for Soil Stabilization will be measured and paid for in accordance with Article 270-4 of the *Standard Specifications*.

Coir Fiber Baffles will be measured and paid for in accordance with Article 1640-4 of the *Standard Specifications*.

__" *Skimmer* will be measured in units of each. __" *Skimmer* will be measured and paid for as the maximum number of each size skimmer acceptably installed and in use at any one time during the life of the project. Barrel and arm pipe, cleanout, relocation and reinstallation of __" *Skimmer* is considered incidental to the measurement of the quantity of __" *Skimmer* and no separate payment will be made. No separate payment shall be made if __" *Skimmer*, barrel and/or arm pipe(s) are damaged by ice accumulation.

Coir Fiber Mat will be measured and paid for as the actual number of square yards measured along the surface of the ground over which coir fiber mat is installed and accepted.

Temporary Slope Drain will be measured and paid for in accordance with Article 1622-4 of the *Standard Specifications*.

Stone for Erosion Control, Class __ will be measured and paid for in accordance with Article 1610-4 of the *Standard Specifications*.

Seeding and Mulching will be measured and paid for in accordance with Article 1660-8 of the *Standard Specifications*.

Seed for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 of the *Standard Specifications*.

Fertilizer for Temporary Seeding will be measured and paid for in accordance with Article 1620-6 of the *Standard Specifications*.

Matting for Erosion Control will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications*.

No measurement will be made for other items or for over excavation or stockpiling.

Payment will be made under:

Pay Item	**Pay Unit**
__" Skimmer	Each
Coir Fiber Mat	Square Yard

COIR FIBER WATTLES WITH POLYACRYLAMIDE (PAM):

Description

Coir Fiber Wattles are tubular products consisting of coir fibers (coconut fibers) encased in coir fiber netting. Coir Fiber Wattles are used on slopes or channels to intercept runoff and act as a velocity break. Coir Fiber Wattles are to be placed at locations shown on the plans or as directed. Installation shall follow the detail provided in the plans and as directed. Work includes furnishing materials, installation of coir fiber wattles, matting installation, PAM application, and removing wattles.

Materials

Coir Fiber Wattle shall meet the following specifications:

100% Coir (Coconut) Fibers	
Minimum Diameter	12 in.
Minimum Density	3.5 lb/ft^3 +/- 10%
Net Material	Coir Fiber
Net Openings	2 in. x 2 in.

Net Strength	90 lbs.
Minimum Weight	2.6 lbs./ft. +/- 10%

Anchors: Stakes shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes a minimum of 2-ft. long with a 2 in. x 2 in. nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving down into the underlying soil.

Matting shall meet the requirements of Article 1060-8 of the *Standard Specifications*, or shall meet specifications provided elsewhere in this contract.

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Polyacrylamide (PAM) shall be applied in powder form and shall be anionic or neutrally charged. Soil samples shall be obtained in areas where the wattles will be placed, and from offsite material used to construct the roadway, and analyzed for the appropriate PAM flocculant to be utilized with each wattle. The PAM product used shall be listed on the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality (DWQ) web site as an approved PAM product for use in North Carolina.

Construction Methods

Coir Fiber Wattles shall be secured to the soil by wire staples approximately every 1 linear foot and at the end of each section of wattle. A minimum of 4 stakes shall be installed on the downstream side of the wattle with a maximum spacing of 2 linear feet along the wattle, and according to the detail. Install a minimum of 2 stakes on the upstream side of the wattle according to the detail provided in the plans. Stakes shall be driven into the ground a minimum of 10 in. with no more than 2 in. projecting from the top of the wattle. Drive stakes at an angle according to the detail provided in the plans.

Only install coir fiber wattle(s) to a height in ditch so flow will not wash around wattle and scour ditch slopes and according to the detail provided in the plans and as directed. Overlap adjoining sections of wattles a minimum of 6 in.

Installation of matting shall be in accordance with the detail provided in the plans, and in accordance with Article 1631-3 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Apply PAM over the lower center portion of the coir fiber wattle where the water is going to flow over at a rate of 2 ounces per wattle, and 1 ounce of PAM on matting on each side of the wattle. PAM applications shall be done during construction activities after every rainfall event that is equal to or exceeds 0.50 in.

The Contractor shall maintain the coir fiber wattles until the project is accepted or until the wattles are removed, and shall remove and dispose of silt accumulations at the wattles when so directed in accordance with the requirements of Section 1630 of the *Standard Specifications*.

Measurement and Payment

Coir Fiber Wattles will be measured and paid for by the actual number of linear feet of wattles which are installed and accepted. Such price and payment will be full compensation for all work covered by this section, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to install the *Coir Fiber Wattles*.

Matting will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Polyacrylamide(PAM) will be measured and paid for by the actual weight in pounds of PAM applied to the coir fiber wattles. Such price and payment will be full compensation for all work covered by this section, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to apply the *Polyacrylamide(PAM)*.

Payment will be made under:

Pay Item	Pay Unit
Polyacrylamide(PAM)	Pound
Coir Fiber Wattle	Linear Foot

TEMPORARY ROCK SILT CHECK TYPE A WITH EXCELSIOR MATTING AND POLYACRYLAMIDE (PAM):

Description

Temporary Rock Silt Checks Type A with Excelsior Matting and Polyacrylamide (PAM) are devices utilized in temporary and permanent ditches to reduce runoff velocity and incorporate PAM into the construction runoff to increase settling of sediment particles and reduce turbidity of runoff. Temporary Rock Silt Checks Type A with Excelsior Matting and PAM are to be placed at locations shown on the plans or as directed. Installation shall follow the detail provided in the plans and as directed. Work includes furnishing materials, installation of Temporary Rock Silt Checks Type A, matting installation, PAM application, and removing Temporary Rock Silt Checks Type A with Excelsior Matting and PAM.

Materials

Structural stone shall be class B stone that meets the requirements of Section 1042 of the *Standard Specifications* for Stone for Erosion Control, Class B.

Sediment control stone shall be #5 or #57 stone, which meets the requirements of Section 1005 of the *Standard Specifications* for these stone sizes.

Matting shall meet the requirements of Excelsior Matting in Subarticle 1060-8(B) of the *Standard Specifications*, or shall meet specifications provided elsewhere in this contract.

Polyacrylamide (PAM) shall be applied in powder form and shall be anionic or neutrally charged. Soil samples shall be obtained in areas where the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM will be placed, and from offsite material used to construct the roadway, and analyzed for the appropriate PAM flocculant to be utilized with each Temporary Rock Silt Check Type A. The PAM product used shall be listed on the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality (DWQ) web site as an approved PAM product for use in North Carolina.

Construction Methods

Temporary Rock Silt Checks Type A shall be installed in accordance with Subarticle 1633-3(A) of the *Standard Specifications*, Roadway Standard Drawing No. 1633.01 and the detail provided in the plans.

Installation of matting shall be in accordance with the detail provided in the plans, and anchored by placing Class B stone on top of the matting at the upper and lower ends.

Apply PAM at a rate of 4 ounces over the center portion of the Temporary Rock Silt Checks Type A and matting where the water is going to flow over. PAM applications shall be done during construction activities and after every rainfall event that is equal to or exceeds 0.50 in.

The Contractor shall maintain the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM until the project is accepted or until the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM are removed, and shall remove and dispose of silt accumulations at the Temporary Rock Silt Checks Type A with Excelsior Matting and PAM when so directed in accordance with the requirements of Section 1630 of the *Standard Specifications*.

Measurement and Payment

Temporary Rock Silt Checks Type A will be measured and paid for in accordance with Article 1633-5 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Matting will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Polyacrylamide(PAM) will be measured and paid for by the actual weight in pounds of PAM applied to the Temporary Rock Silt Checks Type A. Such price and payment will be full compensation for all work covered by this section, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to apply the *Polyacrylamide(PAM)*.

Payment will be made under:

Pay Item	Pay Unit
Polyacrylamide(PAM)	Pound

COIR FIBER MAT:

Description

Furnish material, install and maintain coir fiber mat in locations shown on the plans or in locations as directed. Work includes providing all materials, excavating and backfilling, and placing and securing coir fiber mat with stakes, steel reinforcement bars or staples as directed.

Materials

Item	Section
Coir Fiber Mat	1060-14

Anchors: Stakes, reinforcement bars, or staples shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes 12"- 24" long with a 2" x 2" nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving through the coir fiber mat and down into the underlying soil. The other end of the stake needs to have a 1"- 2" long head at the top with a 1"- 2" notch following to catch and secure the coir fiber mat.

Steel Reinforcement Bars:

Provide uncoated #10 steel reinforcement bars 24" nominal length. The bars shall have a 4" diameter bend at one end with a 4" straight section at the tip to catch and secure the coir fiber mat.

Staples:

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Construction Methods

Place the coir fiber mat immediately upon final grading. Provide a smooth soil surface free from stones, clods, or debris that will prevent the contact of the mat with the soil. Unroll the mat and apply without stretching such that it will lie smoothly but loosely on the soil surface.

For stream relocation applications, take care to preserve the required line, grade, and cross section of the area covered. Bury the top slope end of each piece of mat in a narrow trench at

least 6 in. deep and tamp firmly. Where one roll of matting ends and a second roll begins, overlap the end of the upper roll over the buried end of the second roll so there is a 6 in. overlap. Construct check trenches at least 12 in. deep every 50 ft. longitudinally along the edges of the mat or as directed. Fold over and bury mat to the full depth of the trench, close and tamp firmly. Overlap mat at least 6 in. where 2 or more widths of mat are installed side by side.

Place anchors across the mat at the ends approximately 1 ft. apart. Place anchors along the outer edges and down the center of the mat 3 ft. apart.

Adjustments in the trenching or anchoring requirements to fit individual site conditions may be required.

Measurement and Payment

Coir Fiber Mat will be measured and paid for as the actual number of square yards measured along the surface of the ground over which coir fiber mat is installed and accepted.

No measurement will be made for anchor items.

Payment will be made under:

Pay Item	**Pay Unit**
Coir Fiber Mat	Square Yard

WATTLE:

Description

Wattles are tubular products consisting of excelsior fibers encased in synthetic netting. Wattles are used on slopes or channels to intercept runoff and act as a velocity break. Wattles are to be placed at locations shown on the plans or as directed. Installation shall follow the detail provided in the plans and as directed. Work includes furnishing materials, installation of wattles, matting installation, and removing wattles.

Materials

Wattle shall meet the following specifications:

100% Curled Wood (Excelsior) Fibers	
Minimum Diameter	12 in.
Minimum Density	2.5 lb/ft^3 +/- 10%
Net Material	Synthetic
Net Openings	1 in. x 1 in.
Net Configuration	Totally Encased
Minimum Weight	20 lb. +/- 10% per 10 ft. length

Anchors: Stakes shall be used as anchors.

Wooden Stakes:

Provide hardwood stakes a minimum of 2-ft. long with a 2 in. x 2 in. nominal square cross section. One end of the stake must be sharpened or beveled to facilitate driving down into the underlying soil.

Matting shall meet the requirements of Article 1060-8 of the *Standard Specifications*, or shall meet specifications provided elsewhere in this contract.

Provide staples made of 0.125" diameter new steel wire formed into a *u* shape not less than 12" in length with a throat of 1" in width.

Construction Methods

Wattles shall be secured to the soil by wire staples approximately every 1 linear foot and at the end of each section of wattle. A minimum of 4 stakes shall be installed on the downstream side of the wattle with a maximum spacing of 2 linear feet along the wattle, and according to the detail. Install a minimum of 2 stakes on the upstream side of the wattle according to the detail provided in the plans. Stakes shall be driven into the ground a minimum of 10 in. with no more than 2 in. projecting from the top of the wattle. Drive stakes at an angle according to the detail provided in the plans.

Only install wattle(s) to a height in ditch so flow will not wash around wattle and scour ditch slopes and according to the detail provided in the plans and as directed. Overlap adjoining sections of wattles a minimum of 6 in.

Installation of matting shall be in accordance with the detail provided in the plans, and in accordance with Article 1631-3 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

The Contractor shall maintain the wattles until the project is accepted or until the wattles are removed, and shall remove and dispose of silt accumulations at the wattles when so directed in accordance with the requirements of Section 1630 of the *Standard Specifications*.

Measurement and Payment

Wattle will be measured and paid for by the actual number of linear feet of wattles which are installed and accepted. Such price and payment will be full compensation for all work covered by this section, including, but not limited to, furnishing all materials, labor, equipment and incidentals necessary to install the *Wattle*.

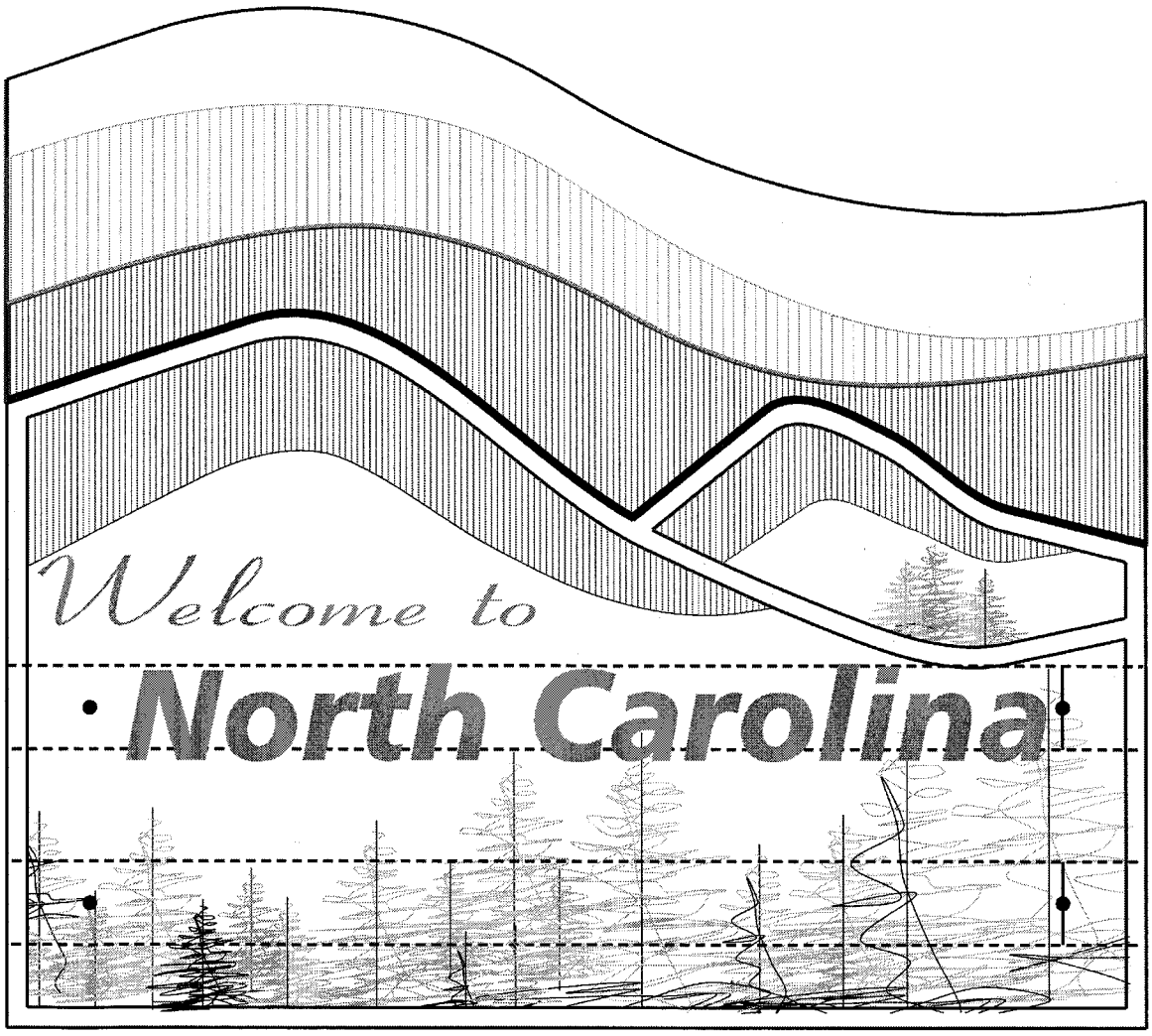
Matting will be measured and paid for in accordance with Article 1631-4 of the *Standard Specifications*, or in accordance with specifications provided elsewhere in this contract.

Payment will be made under:

Pay Item	**Pay Unit**
Wattle	Linear Foot

K5002 REST AREA SITE DEVELOPMENT

US 23/74 HAYWOOD COUNTY
CONTRACT C203202



ROADSIDE ENVIRONMENTAL UNIT
1557 MSC RALEIGH, NC 27699

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NORTH CAROLINA PROFESSIONAL SEAL 028878 ENGINEER KENNETH D. PACE

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PLANTING

See Standard Specifications Sections 1060 - Landscape Development Materials and 1670 - Planting.

Seasonal Limitations: The initial planting and replacement of plants will be accomplished between October 15th and March 31st for all woody plant material (trees, shrubs and ground covers). All herbaceous plants and containerized grasses will be planted between September 1st and November 30th and March 1st and May 15th depending on requirements of each species. Exceptions to these seasonal limitations are at the discretion of the Engineer and will be submitted in writing. Submit for approval proposed schedule for plant installation, along with plant sources and contact information for them, by July 1st of the year that planting is to begin.

Establishment Period for Planting: An establishment period will begin after satisfactory installation and acceptance of all of the planting and *will apply only to the woody plant materials: trees, shrubs and ground covers*. All plants must be in an upright healthy condition, planted at the proper depth, mulched areas will be weed free and tidy and any staking or guying that is utilized must be in proper condition prior to beginning the establishment period. During the establishment period the contractor will be responsible for proper care of the plantings in accordance with Section 1670-14 Establishment.

All plants that do not continue to conform to the specifications and quality as approved when they were installed will be unacceptable. The contractor will remove all plants that are determined to be unacceptable from the site within five days of request by the Engineer. Replacements will be installed within the Seasonal Limitations.

Each month during the establishment period a meeting will be held between the Engineer and the Contractor to discuss establishment work required during that period. Additional meetings may be scheduled if deemed necessary by the Engineer. All the required work will be performed in a timely manner and with utmost regard to the safety and convenience of the rest area users. Failure on the part of the contractor to complete the required work in a satisfactory manner will result in the Department having the work performed by others and paid for by the Performance Bond.

All requirements of Section 1670-14 Establishment will also be applicable during the Establishment Period for Planting. The Establishment Period for Planting will last a

minimum of twelve months and extend into the seasonal limitations for planting in order to allow replacement plantings to be installed. See contract times for exact time period and dates.

BIO-RETENSION PLANTING

General: Supply and install plantings of the species, quantity, size and spacing shown on the Landscape Plans and Details sheets, and as directed by the Engineer.

Compensation: The work of supplying and installing Bio-Retention Basin planting, when completed and accepted, will be paid for under the Landscape Planting (SBL) "Lump Sum." Such unit price to be considered full payment, including but not limited to, all labor, materials, and any other incidentals necessary or required to complete the work and shall be a part of the overall landscape development of the SBL site

Basis of Payment: Landscape planting will be paid for at the contract "Lump Sum" unit price per each location (NBL and SBL).

Landscape Planting (SBL).....Lump Sum
Landscape Planting (NBL).....Lump Sum
Water for Planting ..... 1,000 Gallon / MG
Mulch for Planting ..... Cubic Yard / CY

WATER FOR PLANTING

Water for Planting: Water for Planting will be applied in accordance with the standard specifications. Water for Planting will be furnished as described herein. It is anticipated that installation of the landscape planting and sod, and therefore watering of plant materials and sod, will occur after the site water system has been installed, connected and is functional. Consequently the water for this project will be provided to the contractor through the onsite water system. Should a problem occur with the onsite water system the contractor will be required to furnish water from an alternative source. If necessary, this watering shall cover initial installation and the time period when the site irrigation is unavailable. All applicable sections of Section 1060, 'Landscape Development Materials' and Section 1670, 'Planting' of the Standard Specifications will apply.

Water for planting will not be paid for - if Contractor utilizes Onsite Water System.

Water during the 12 month establishment period is an incurred cost incidental to the overall cost of the landscape planting.

Payment will be made under:

Water for Planting . . . . . M/G

100

MULCH FOR PLANTING

Mulch for planting shall consist of pine bark mulch (approximately 2-2 ½" size) . All mulch and the work associated in placing the mulch during planting shall conform to article 1060-11 of the Standard Specifications.

Mulch for Planting: Mulch will be from a single source unless otherwise approved by the Engineer. **Submit sample for approval prior to placement.**

Install mulch to a finished depth of 4 inches (unless otherwise noted), rake and compact to create a uniform finish. *Payment will be made under:*

Mulch for Planting . . . . . .CY

HERBICIDES

Post-emergence herbicidal treatment and Pre-emergent herbicidal treatment will consist of the following products and rates unless otherwise approved by the Engineer. Follow guidelines noted in the Standard Specification Section 1670.

Herbicide Chart

Herbicide Brand Name	Common Name	Formulation	Oral LD/50 (MG/KG)	Amount of Formulation per Acre	Lbs. of Active Ingredient per Acre	Adjuvants	Remarks
Stump Control							
Garlon	Triclopyr	3 S	2,574	1 gal./1 gal. of water	3 #	1 - 2 qts. Surfactant/acre	Paint or spray, add bullseye dye.
Pre-emergent							
Pennant + *Endurance* + *Gallery*	Metolachlor + Prodiamine + Isoxaben	Liquid (5G) + 65 WDG + 75 DF	3750 + >5,000 + 5,000	2 - 3 pts. (40#) + 2# + 1#	1.95 - 2.93# (2#) + 20 lbs. + 1#	NA	Spring application; use tank agitation when mixing.
Post-emergent							
Roundup	Glyphosate	4 S	>5,000	2 - 4 qts.	2 - 4 #	2 - 4 qts. Surfactant/ 100 gals.	NA

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Basis of Payment: Pre-emergent herbicidal treatment and Post-emergent herbicidal treatment will be measured and paid for in square yards of plant bed measured along the surface of the ground.

Pre-Emergent Herbicidal Treatment for Plant Beds.....Square Yard
Post-Emergent Herbicidal Treatment for Plant Beds.....Square Yard

12 MONTH AGED HARDWOOD MULCH

General
The work covered by this item consists of furnishing and installing the specified mulch for placement in the Bio-Retention Basin plantings in accordance with the material and dimensions as shown on the plans, the details, and as described herein.

Materials
Mulch will be double shredded hardwood with less than 10% floatables. It shall have been aged for a minimum period of one year (for decomposition of non-hardwood materials). The mulch shall be clean of any foreign trash or debris. Submit sample for approval prior to placement.

Installation
Install the double shredded hardwood mulch to a finished depth of 4" or as defined by the plans and/or as directed by the Engineer. Contractor shall rake and compact to create a continuous smooth finished grade.

Compensation
The work of furnishing and installing the 12 month aged hardwood mulch, when completed and accepted, will be paid for at the contract unit price per Cubic Yard for '12 Month Aged Hardwood Mulch'.

If additional mulch is furnished in bags, measurement will be as indicated on package label and multiplied by the number of sealed full bags that are utilized. If mulch is furnished in trucks, each truck will be measured by the Engineer and will bear a legible identification mark indicating its capacity. Each truck will be loaded to its measured capacity at the time it arrives at the site. 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, and equipment and any other incidentals necessary or required to complete the work.

Payment will be made under:

12 Month Aged Hardwood Mulch ..... CY

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LANDSCAPE METAL EDGING

General

The work covered by this item will consist of furnishing and installing the metal landscape edging in locations as directed by the engineer.

Landscape Metal edging construction will conform to Col-Met Commercial Grade Metal Edging or equivalent. Metal Edging will be 3/16" (4.8mm) hot rolled low carbon steel (ASTM–A-36, ASTM-A-283, ASTM-A-569) with a 6" width. Edging will include a minimum of 4 stakes per 10' length. Stakes will be 16" long. Prefabricated corners and prefabricated chamfered ends shall be used per manufacturer instructions – ***Contractor will not be allowed to manipulate edging without engineer's approval.*** Color will be a black electrostatic powder coated finish resistant to cracking, chipping, corrosion and UVA damage.

Compensation

The work of installing landscape metal edging as approved by the Engineer, when completed and accepted, will be paid for at the unit price per linear foot for "Landscape Metal Edging". 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, and equipment and any other incidentals necessary or required to complete the work.

Payment will be made under:

Landscape Metal Edging ..... LF

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

SITE DEMOLITION

General

Site demolition consists of the removal and disposal of, concrete sidewalks, structures, and site amenities. Contractor shall remove the Existing Visitor Center Kiosk Structure, the kiosk structure and all items connected to the kiosk structure shall be removed from the site and disposed of by the by the Contractor as approved by the Engineer. Vegetative material designated to be removed as indicated on the plans and as directed by the Engineer, includes trees and shrubs with stumps, and plant beds as designated on the plans and as directed by the Engineer on site. Any picnic tabletops, benches, recycle bins, and trash receptacles noted on plans or as directed by the engineer to be removed by contractor, shall be 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 concrete 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 the 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 reinstallation on the project will become the property of the Contractor, and will be properly disposed of by the Contractor off site. The Engineer reserves the right to retain any item(s) for future use by the Department.

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.

Contractor shall repair or replace all water, sewer, electrical, telephone and drainage lines, as well as lights, light poles and remaining structures damaged during this project as incidental to the project ,all such work shall be completed as directed by Engineer.

Compensation
Payment for the work of removing and disposing of all sidewalks, structures, site amenities and vegetation as described above, indicated on plans and directed by the Engineer, will be paid for at the contract unit price 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 (NBL) ..... Lump Sum

LANDSCAPE GRADING

General
Landscape and Site grading consists of 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.

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

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

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 elevated sidewalks/concrete paving to a density equal to or greater than undisturbed soil in the area.

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

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

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

Payment will be made under:

Landscape Grading (SBL) .....LS
Landscape Grading (NBL) .....LS
Topsoil .....CY

STORMWWATER DRAINAGE SYSTEM

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 water drainage and related work indicated on the drawings or in the specifications in general as follows:

General
The work covered by this provision consists of excavation, fabrication, furnishing, installing all items associated with the storm water drainage system, including but not limited to, drop inlets, subsurface drain pipes, fittings, downspout adapters, cleanouts, and connections, all at required depths to facilitate proper flow, as shown on the plans and as directed by the Engineer.

Drainage Structures

The drainage structure shall meet all NC Department of Transportation Standard Specifications and as defined by the plans and special provisions as defined for this project.

Materials

The storm water catch basin structures, riser, and outlets shall be Concrete Drop Inlet as shown in Roadway Standard Drawing 840.14 with pedestrian grate(s) as indicated on the plans/ details. The inlet grate shall be cast iron, galvanized steel or approved equal. The inlet grate shall be from the same manufacturer as the catch basin and shall contain small drainage slots -suitable for pedestrian foot traffic.

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.

Building Downspout Connections

Building 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

Storm Drainage Pipe

Pipe Material
Storm drainage pipe will be Sch-40 polyvinyl chloride (PVC) meeting requirements of ASTM, NCDOT, and manufacturers specifications. To be installed as noted below and on the plans. All fittings, adapters, and connection shall be installed according to applicable specifications.

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 50-75 feet apart (2"pipe) 75 feet apart (3"-12"-pipe). 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 flush with sidewalk, all other locations shall have a concrete collar.

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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

Storm water 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:

Storm Water Drainage System (SBL) ..... Lump Sum
Storm Water Drainage System (NBL) ..... Lump Sum

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4" CONCRETE SIDEWALKS

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

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

Scoring patterns and joints 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". Control Joints shall be every 5' or at any location directed by Engineer. Expansion Joints shall be every 15' or at any location directed by Engineer. There will be no additional compensation for Control and Expansion Joints.

Payment will be made under:

4" Concrete Sidewalk . . . . . SY

PAVERS

General: The work covered by this section shall consist of furnishing and installing the Concrete Pavers in accordance with dimensions and finishes as shown on the plans, the details, and as described herein.

Materials and Construction

Stone shall be a Belgard "Lafitt" – 60mm Thick with varying lengths and layed in a Modular 3 piece pattern B (10-15% Large Square) or similar Paverstone or Unilock comparative to be approved by engineer. All concrete paver sections shall be outlined with a Large Rectangle 7 1/16 x 10 5/8 x 2 3/8 edging as shown on hardscape plans. Color : shall be a fieldstone blend of earthtones or similar to the Belgard "Lafitt" Blue Ridge coloring. Edging shall be installed as noted on the plans and details. Edging shall be placed in line and plumb with proposed grades and sidewalks. Contractor shall be an experienced contractor with a minimum of seven years' experience installing landscape edging and concrete pavers. Contractor shall supply references and samples to engineer prior to construction.

Method of Measurement and Basis of Payment

The work of furnishing and installing 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 "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:

Pavers .....SF

SEGMENTED RETAINING WALL

General: Work includes furnishing and installing precast concrete modular block stone retaining wall units. Acceptable product and manufacturers are Triangle Precast Block Stone, Anchor Wall Natural Impressions, Redi Rock Ledgestone, and Manitou Stone (or approved equal) with a 4" light grey precast capstone to the lines and grades designated on the construction drawings and as specified herein.

Contractor shall have 7-Years' experience installing segmented retaining wall systems. Contractor shall supply references and samples to Engineer prior to construction. Contractor shall provide Engineered Drawings for walls proposed on this project.

Materials and Construction

Modular Wall Units

A. Wall units shall be units as produced by a licensed manufacturer.

B. Wall units shall have minimum 28 day compressive strength of 3000 psi (20.7 MPa) in accordance with ASTM C1372. The concrete units shall have adequate freeze-thaw protection in accordance with ASTM C1372 or an average absorption rate of 7.5 lb/ft3 (120 kg/m3) for northern climates and 10 lb/ft3 (160 kg/m3) for southern climates.

C. Exterior dimensions shall be uniform and consistent. Maximum dimensional deviations on the height of any two units shall be 0.125 in. (3 mm).

D. Wall units shall provide a minimum of 110 lbs total weight per square foot of wall face area (555 kg/m2). Fill contained within the units may be considered 80% effective weight.

E. **All exterior wall face(s) shall be textured**. Color as specified by owner.

Wall Rock

A. Material must be well-graded compactable aggregate, 0.25 in. to 1.5 in., (6 mm - 38 mm) with no more than 10% passing the #200 sieve. (ASTM D422)

B. Material behind and within the blocks may be the same material.

Infill Soil:

A. Infill material shall be site excavated soils when approved by the on-site soils engineer unless otherwise specified in the drawings. Unsuitable soils for backfill (heavy clays or organic soils) shall not be used in the reinforced soil mass. Fine grained cohesive soils (f<31) may be used in wall construction, but additional backfilling, compaction and water management efforts are required. Poorly graded sands, expansive clays and/or soils with a plasticity index (PI) >20 or a liquid limit (LL) >40 should not be used in wall construction.

B. The infill soil used must meet or exceed the designed friction angle and description noted on the design cross sections, and must be free of debris and consist of one of the following inorganic USCS soil types: GP, GW, SW, SP, SM, SM-SC meeting the following gradation as determined in accordance with ASTM D422.

Sieve Size	Percent Passing
4 inch	100 - 75
No. 4	100 - 20
No. 40	0 - 60
No. 200	0 - 35

C. Where additional fill is required, contractor shall submit sample and specifications to the wall design engineer or the on-site soils engineer for approval and the approving engineer must certify that the soils proposed for use has properties meeting or exceeding original design standards.

WALL CONSTRUCTION

Excavation:

A. Contractor shall excavate to the lines and grades shown on the construction drawings. Contractor shall use caution not to over-excavate beyond the lines shown, or to disturb the base elevations beyond those shown.

B. Contractor shall verify locations of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation.

Foundation Soil Preparation:

A. Foundation soil shall be defined as any soils located beneath a wall.

B. Foundation soil shall be excavated as dimensioned on the plans and compacted to a minimum of 95% of Standard Proctor (ASTM D698) prior to placement of the base material.

C. Foundation soil shall be examined by the on-site soils engineer to ensure that the actual foundation soil strength meets or exceeds assumed design strength. Soil not meeting the required strength shall be removed and replaced with acceptable material.

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Base:

A. Base material shall be placed as shown on the construction drawing. Top of base shall be located to allow bottom wall units to be buried to proper depths as per wall heights and specifications.
B. Base material shall be installed on undisturbed native soils or suitable replacement fills compacted to a minimum of 95% Standard Proctor (ASTM D698).
C. Base shall be compacted at 95% Standard Proctor (ASTM D698) to provide a level hard surface on which to place the first course of blocks. The base shall be constructed to ensure proper wall embedment and the final elevation shown on the plans. Well-graded sand can be used to smooth the top 1/2 in. (13 mm) on the base material.
D. Base material shall be a 4 in. (100 mm) minimum depth for walls under 4 ft (1.2 m) and a 6 in. (150 mm) minimum depth for walls over 4 ft (1.2 m).

Unit Installation:
A. The first course of wall units shall be placed on the prepared base with the raised lip facing up and out and the front edges tight together. The units shall be checked for level and alignment as they are placed.
B. Ensure that units are in full contact with base. Proper care shall be taken to develop straight lines and smooth curves on base course as per wall layout.
C. Fill all cores and cavities and a minimum of 12 in. (300 mm) behind the base course with wall rock. Use approved soils to backfill behind the wall rock and in front of the base course to firmly lock in place. Check again for level and alignment. Use a plate compactor to consolidate the area behind the base course. All excess material shall be swept from top of units.
D. Install next course of wall units on top of base row. Position blocks to be offset from seams of blocks below. Perfect "running bond" is not essential, but a 3 in. (75 mm) minimum offset is recommended. Check each block for proper alignment and level. Fill all cavities in and around wall units and to a minimum of 12 in. (300 mm) depth behind block with wall rock. For taller wall application the depth of wall rock behind the block should be increased; walls from 15ft (4.57m) to 25ft (7.62m) should have a minimum of 2ft (0.61m) and walls above 25ft (7.62m) should have a minimum of 3ft (0.91m). Spread backfill in uniform lifts not exceeding 8 in. (200 mm) in uncompacted thickness and compact to 95% of Standard Proctor (ASTM D698) behind the consolidation zone.
E. The consolidation zone shall be defined as 3 ft (1 m) behind the wall. Compaction within the consolidation zone shall be accomplished by using a hand operated plate compactor and shall begin by running the plate compactor directly on the block and then compacting in parallel paths from the wall face until the entire consolidation zone has been compacted. A minimum of two passes of the plate compactor are required with maximum lifts of 8 in. (200 mm). Expansive or fine-grained soils may require additional compaction passes and/or specific compaction equipment such as a sheepsfoot roller. Maximum lifts of 4 inches (100 mm) may be required to achieve adequate compaction within the consolidation zone. Employ methods using lightweight compaction equipment that will not disrupt the stability or batter of the wall. Final compaction requirements in the consolidation zone shall be established by the engineer of record.

F. Install each subsequent course in like manner. Repeat procedure to the extent of wall height.
G. As with any construction work, some deviation from construction drawing alignments will occur. Variability in construction of SRWs is approximately equal to that of cast-in-place concrete retaining walls. As opposed to cast-in-place concrete walls, alignment of SRWs can be simply corrected or modified during construction. Based upon examination of numerous completed SRWs, the following recommended minimum tolerances can be achieved with good construction techniques.

Vertical Control - ±1.25 in. (32 mm) max. over 10 ft (3 m) distance.
Horizontal Location Control - straight lines ±1.25 in. (32 mm) over a 10 ft (3 m) distance.
Rotation - from established plan wall batter: 2.0°
Bulging - 1.0 in. (25 mm) over a 10 ft (3.0 m) distance

Additional Construction Notes
A. When one wall branches into two terraced walls, it is important to note that the soil behind the lower wall is also the foundation soil beneath the upper wall. This soil shall be compacted to a minimum of 95% of Standard Proctor (ASTM D698) prior to placement of the base material. Achieving proper compaction in the soil beneath an upper terrace prevents settlement and deformation of the upper wall. One way is to replace the soil with wall rock and compact in 8 in. (200 mm) lifts. When using onsite soils, compact in maximum lifts of 4 in. (100 mm) or as required achieving specified compaction.
B. Filter fabric use is not suggested for use with cohesive soils. Clogging of such fabric creates unacceptable hydrostatic pressures in soil reinforced structures. When filtration is deemed necessary in cohesive soils, use a three dimensional filtration system of clean sand or filtration aggregate.
C. Embankment protection fabric is used to stabilize rip rap and foundation soils in water applications and to separate infill materials from the retained soils. This fabric should permit the passage of fines to preclude clogging of the material. Embankment protection fabric shall be a high strength polypropylene monofilament material designed to meet or exceed typical Corps of Engineers plastic filter fabric specifications (CW-02215); stabilized against ultraviolet (UV) degradation and typically exceeding the values on Table 1 (see pg. 8 of Spec Book)
D. Water management is of extreme concern during and after construction. Steps must be taken to ensure that drain pipes are properly installed and vented to daylight and a grading plan has been developed that routes water away from the retaining wall location. Site water management is required both during construction of the wall and after completion of construction.
E. Installation of the cap course, and any other partial placement of block in systematic arrangement of the last exposed course, shall be adhered in place with construction grade adhesive, as specified by the 'block' manufacturer and approved by the engineer.

Reference Standards
ASTM C1372 Standard Specification for Segmental Retaining Wall Units.
ASTM 1262 Evaluating the Freeze thaw Durability of Manufactured CMU's and Related concrete Units

ASTM D698 Moisture Density Relationship for Soils, Standard Method
ASTM D422 Gradation of Soils
ASTM C140 Sample and Testing concrete Masonry Units

Delivery, Storage, and Handling

A. Contractor shall check the materials upon delivery to assure proper material has been received.

B. Contractor shall prevent excessive mud, wet cement, and like construction debris from coming in contact with the materials.

C. Contractor shall protect the materials from damage. Damaged material shall not be incorporated in the project (ASTM C1372).

Submittals

Modular Wall Block:

1. Manufacturer's product catalog sheets with specifications.

2. Four representative full-size samples of the type, thickness, color, and finish. Submit samples indicating the range of color expected in the finished installation.

3. Accepted samples become the standard of acceptance for the work of this Section.

4. Manufacturer's written product specifications.

Mock-Ups:

1. Install a 10 ft wide x 3 ft tall wall section

2. Use this area to determine block placement, pattern, drainage, and elevation requirements.

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.

No work on the final construction of the retaining wall shall proceed until the wall section is approved by the Engineer, and the contractors Wall Design Engineer.

5. If mock-up is not retained, remove and properly dispose of mock-up.

Method of Measurement and Basis of Payment

The unit of measurement for furnishing and fabricating the Segmented Retaining Wall shall be the vertical square foot of wall surface from the top of the leveling pad to the top of the wall or wall coping. The accepted quantities of Segmented Retaining Wall will be paid at the contract unit price, which shall be full compensation for design, supply, and installation

of the "Segmented Retaining Wall" including but not limited to furnishing all labor, materials, equipment and any other incidentals necessary or required to complete the work.

Payment will be made under:

Segmented Retaining Wall..... Square Foot ✓

STONE SEATWALLS

General: The work covered by this section shall consist of furnishing and constructing the Stone Walls-Concrete Block with Stone Veneer as shown on the plans and details and as described herein.

The Engineer according to site conditions may adjust the height and length. Verify exact dimensions before proceeding.

Materials: Concrete shall be Class "A" and meet the requirements of Section 1000 of the Standard Specifications. Reinforcing steel shall meet the requirements of Section 1070. Concrete block shall be "Ivany Block" specifically manufactured for reinforced masonry wall construction. The 2" Thinstone Veneer shall be like an El Dorado-Woodlands Bluffstone or comparatives would be Canyon Stone, or Coronado, to match the exterior thinstone veneers on the new constructed facility. The Stone capping shall be a 2" thick dimensional Bluestone with a Rock faced edge on the outside edges. The Concretecapping shall be 20" wide and cut in 6-8' sections. Stone height shall vary from 3" to 9" and length shall vary from approximately 4" to 18". Mason shall place stone randomly with dry stacked joints. See sheet L14 for details. Stone Veneer samples shall be submitted to the Engineer for approval prior to any placement. Use Type S mortar. Ties shall be 3/16" diameter wire, 7 1/2" anchor with 3 1/4" tie min. Use Heckman Double Eye-Rod Anchor/Tie No. 263, Homann and Banard Adjustable Wall Tie No. 600, or National No. 915. Backfill shall be Class I Select as described in Section 1016.

Installation: Excavate and pour reinforced concrete footing, build reinforced block wall, and lay stone veneer and coping as shown on the drawings. Place reinforcing steel as described in Section 425. Use one metal tie per every two square foot of surface area to bound the stone veneer to the block wall. Allow the masonry to cure a minimum of 7 days prior to placing backfill.

An experienced stone mason with a minimum of 7 years of practice shall be required to construct the stone walls. Mason must submit references and samples of built work prior to beginning work. A sample wall with approximately 20 square feet of veneer surface area and a minimum of 5 linear feet of capping shall be required prior to progressing with remaining walls. The sample wall shall be a separate wall or incorporated into proposed walls as shown on plans. The sample wall shall be approved prior to proceeding with the installation.

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Method of Measurement

The quantity of Stone Wall will be the actual number of linear feet constructed and accepted.

Basis of Payment

Payment as described above will be full compensation for all work covered by this section including but not limited to footing excavation, furnishing and installing reinforcing steel, concrete, block, stone veneer, foundation drain, backfill, and other incidental material; and all labor and equipment necessary to complete the work.

Payment will be made under:

Stone Seatwall. . . . . LF √

CONCRETE STEPS AND HANDRAILS

General
This provision consists of constructing concrete stairs and handrails as shown on the plans and details, including all materials, labor, equipment and grading to complete the work.

All applicable requirements of Incidental Concrete Construction-General, Section 825, Reinforced Brick Masonry Construction – General, Section 832 and Fabricating and Placing Reinforcement, Section 425 of the Standard Specifications will apply.

Materials
Concrete will be Class B. Brick, if necessary, will be the same as Rest Area building face brick. Handrails will be Schedule 40, 1 ½" outside diameter aluminum pipe with a clear brushed anodized finish.

Construction/Installation
Construct concrete in accordance with Section 825, except as otherwise noted herein. Furnish and place reinforcement, as shown on the plans and details, in accordance with the provisions of Section 425. Give formed surfaces of the concrete a rubbed finish. Give unformed surfaces a float finish.

Erect handrails as shown on the details, straight and true to line and grade. They will be core mounted into pipe sleeve as recommended by manufacturer. All welds will be filed smooth to the touch.

Compact backfill to a degree comparable to the adjacent undisturbed material.

Compensation

Concrete steps will be paid for as 'Concrete Steps' in cubic yards of concrete, computed from the dimensions shown on the plans or established by the Engineer, which has completed and accepted.

Aluminum Handrails will be paid for as 'Handrails on Steps' in linear feet as measured along the surface of the completed and accepted work.

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.

Payment will be made under:
Concrete Steps ..... CY
Handrail on Steps ..... LF

<u>Sitting Bench</u>

General
This special provision consists of furnishing and installing a 6' Park Bench as noted on the plans and as described herein. Provide 'cut sheet-shop drawing for approval.

Materials

The prefabricated metal park bench shall be Steel Bench with Metal Armor coating or equivalent. This bench has an arched back with a center armrest. Constructed of hot rolled steel with Thermoplastic functional polyethylene copolymer-based coating.

Concrete base pad (3' x 8') is quantified as 4" Concrete sidewalk (see 4" Concrete Sidewalk spec).

Installation
Anchor park bench to concrete pad with galvanized expansion hardware or as instructed by manufacturer and approved by the Engineer.

Drop-in Anchor Installation: Drill manufacture recommended holes into pre-marked holes on the concrete surface with a carbide tipped masonry drill bit conforming to ANSI B94, 12-77, matching the bit size with the outside diameter of the drop-in anchor being used. Make sure hole depth exceeds minimum embedment. Set and attached anchor to bench foot. Confirm final installation with Engineer.

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Compensation
Park bench will be paid for as 'Sitting Bench' per each installed, completed 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.

Payment will be made under:

Sitting Bench. . . . . EA

FLAGPOLE

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

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

Installation: Follow the manufacturer's recommendations concerning ground set mounting for a 90 M.P.H. design a wind load. Coordinate the installation of the flagpole with the placement of the flagpole light and all site work and utilities.

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

Payment will be made under:

Flagpole . . . . . Each

FLAGPOLE & SIGN LIGHTS

General

The work covered by this section consists of furnishing and installing a ground mounted LED Flood Light Fixture (2 at flagpoles SBL, 1 at NBL flagpole and 1 at the "Welcome to NC Sign) and site electrical service for each location as shown on the drawings and as directed by the Engineer. The light shall be a Rectangular shaped LED floodlight with a. 100,000-hour LED lifespan Warranty. Light shall be UL Listed, Suitable for Wet Locations, Wired for 240V-with constant current driver ,Three multi-chip, 13Watt high performance LEDs (*Equivalent in delivered lumens to a150W Metal Halide Fixture*).

Installation

Follow the manufacturer's recommendations for in-ground installation.
Work to be completed by a licensed electrician.

Compensation

The work of furnishing and installing the "flagpole & Sign lighting", when completed and accepted, will be paid for at the contract unit price each for 'Flag Pole Light'.

Such payment will be full compensation for all work covered by this section including, but not limited to, furnishing and installing the flagpole light, and all parts recommended by the manufacturer for a proper ground-set installation; and all labor, materials and equipment necessary to complete the work.

Payment will be made under:

Flag Pole & Sign Lighting . . . . . EA

WASTE CONTAINER

General: Waste container shall be furnished and installed in tandem with Recycling Container on 4"x5'x5' concrete pad in accordance with detail plans and shall be located as shown on the plans or as directed by the Engineer.
Waste container unit shall be the product of a manufacturer regularly engaged in the design and manufacture of precast exposed aggregate waste containers.
(See Waste/Recycle Container Detail Plan Sheet for size, design, material, etc.) Provide model TF1030 (A-3-color) by Wausau Tile to match existing units on site or approved equal. Submit six (6) copies of shop drawings or submittal data to Engineer for approval. Finish color shall be "Sand" hoods and "Brown" containers. Submit six (6) copies of shop drawings or submittal data to Engineer for approval.

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Compensation:

The quantity of waste container units to be paid for shall be the actual number of Waste Container units with concrete pads, complete in place and accepted, at the contract unit price each for each "Waste Container".(Precast conc.) Such price and payment will be full compensation for the work of furnishing and installing the waste container, including but not limited to, all labor, materials, tools, equipment and all incidentals necessary to complete the work.

Payment will be made under:

Waste Container . . . . . EA

RECYCLING CONTAINER

General:

Recycling container shall be furnished and installed in tandem with Waste Container on 4"x5'x5' concrete pad in accordance with detail plans and shall be located as shown on the plans or as directed by the Engineer.

Recycling container unit shall be the product of a manufacturer regularly engaged in the design and manufacture of precast exposed aggregate waste containers.
(See Waste/Recycle Container Detail Plan Sheet for size, design, material, etc.) Recycling Container shall have international Blue recycling logo cast into one side. Finish color shall be "Blue" hoods and "Brown" containers. Provide model TF1030 (A-3-color) by Wausau Tile to match existing units on site or approved equal. Submit six (6) copies of shop drawings or submittal data to Engineer for approval.

Compensation:

The quantity of waste container units to be paid for shall be the actual number of Recycling Container units with foundation slabs, complete in place and accepted, at the contract unit price each for each "Recycling Container" (Precast conc.)". Such price and payment will be full compensation for the work of furnishing and installing the waste container, including but not limited to, all labor, materials, tools, equipment and all incidentals necessary to complete the work.

Payment will be made under:

Recycling Container . . . . . EA

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SODDING (HARD FESCUE/BLUEGRASS)

Description

This work consists of placing sod on shoulders, slopes, ditches, or other roadside areas, as directed. The sod shall be prepared in accordance with the requirements of Section 1664 of the *Standard Specifications* and the requirements of this section. See the Landscape Plans (L7&L14) for areas to be sodded.

Materials

Only "approved sod" (trade designation) consisting of a mixture of 50% Kentucky Bluegrass and 50% Hard Fescue shall be used. The sod, machine cut to the supplier's standard width and length, shall be 5/8" minimum, excluding top growth and thatch, at the time of cutting. Before cutting, the sod shall be uniformly mowed at a height of 1 ½" to 2 ½". Standard sod sections shall be sufficiently strong to support their own weight and retain their size and shape when suspended vertically from a firm grasp on the upper 10% of the section. The sod may be either 42" wide roll sod or 18" by 36" strips.

Approved Kentucky Bluegrass Cultivars:

Adelphi	Brilliant	Kenblue	Princeton
Apollo	Bristol	Liberator	Ram I
Bariris	Challenger	Merit	Rugby
Baron	Columbia	Nuglade	Sydsport
Baronie	Fylking	Odyssey	Touchdown
Bartitia	Glade	Plush	Vantage

Approved Hard Fescue Cultivars:

Aurora	Minotaur	Scaldis	Waldina
Bardur	Nordic	Spartan	Warwick
Crystal	Reliant	Valda	

The Contractor shall obtain a certificate or limited permit issued by the North Carolina Department of Agriculture and Consumer Services (1-800-206-9333) or (919-733-6932) stating that the sod has been found to be free of injurious plant pests.

Sod shall be delivered on site within 24 hours of being cut and be covered by acceptable means during delivery. A certificate from the sod producer stating the date and time of sod cutting shall accompany the sod when it arrives at the project site.

The Contractor shall provide sufficient water to meet the requirements of this section.

Construction Methods

(A) Soil Preparation

Remove litter and other debris. Mow and satisfactorily dispose of weeds or other unacceptable growth on the areas to be sodded.

Prior to beginning preparation of the soil to receive sod, all eroded, uneven and rough areas shall be contour graded and/or filled with soil as directed. The soil shall be scarified or otherwise loosened to a depth of not less than 5". Clods shall be broken and the top 2" to 3" of soil shall be worked into an acceptable soil bed by the use of soil pulverizes, drags, or harrows.

After soil preparation, lime and fertilizer shall be uniformly distributed by mechanical means using a 42" drop-type spreader and thoroughly mixed with the top 5" of the soil by disking, harrowing, or other approved methods. The rates of lime and fertilizer per acre are as follows:

500#	10-20-20 Fertilizer
4000#	Limestone

The area shall then be harrowed, dragged, raked, or prepared by other approved methods which will give a lawn type finish. All trash, debris and stones larger that 1 ½" in diameter or other obstructions that could interfere with the placing of the sod shall also be removed. The finished surface shall be moistened with water prior to placing the sod as directed.

(B) Sod Placement

Sod handling and placement shall be a continuous process of cutting, transporting and installing including repairing seams and voids. Sod shall always be installed within 48 hours after being cut. Sod shall be watered within 2 hours of installation.

Any sod or portions of sod rejected by the Engineer during the initial placement shall be removed from the project and replaced with acceptable sod immediately. The Contractor shall cease any and all other placement of sod on the project until rejected sod has been replaced.

After sod has been placed, and staked where necessary, according to Section 1664 of the *Standard Specifications*, it shall then be rolled or tamped carefully and firmly by means acceptable to the Engineer to ensure proper soil contact. If rolled, roller shall weigh 150 lb. /ft. of roller width. Use of rubber tired equipment to roll shall not be allowed. Metal staples, 12" long unless otherwise approved, shall be made of 11-gauge new steel wire so as not to bend when pinned or driven through the sod. Extreme care shall be taken to prevent the installed sod from being torn or displaced. After rolling or tamping the sod, it shall be watered uniformly and thoroughly with a minimum of 1" of water, 5.6 gallons per square yard, applied immediately after installation of sod. In no case shall the time interval between sod placement and initial watering exceed 2 hours. Water shall be placed to the

required quantity through sequential passes to insure proper coverage and to prevent runoff. A minimum of ¼" should be placed on each pass.

(C) Maintenance

The Contractor shall be responsible year round for all watering and other maintenance required to maintain the livability of the sod from installation until final acceptance, including monitoring the sod to ensure all watering and other maintenance is performed as required.

The Contractor shall be responsible for all watering and other maintenance required to maintain the livability and health of the sod from installation until completion of the observation period. Additional water shall be applied as needed and as directed to maintain the livability of the sod. Each additional watering event shall be a minimum of 0.5" of water, 2.8 gallons per square yard, uniformly applied over the sodded area and may be placed in a series of passes to prevent runoff, with a minimum of ¼" on each pass.

Any sod or portions of sod rejected by the Engineer after placement, but prior to beginning the observation period, shall be removed from the project and replaced with acceptable sod. Satisfactory replacement of sod shall begin within 10 days of notification. Failure to replace and repair damaged or dead sod as directed may result in sanctions under Article 108-7 or Article 108-8 of the *Standard Specifications*.

(D) Observation Period

The observation period for the sod on this project shall be from March 1 to October 1. Sodding shall be inspected by the Roadside Environmental Field Operations Engineer to begin and end the observation period.

The Contractor shall maintain responsibility for the sod for an observation period beginning upon the satisfactory completion and acceptance of all work required in the plans or as directed. The Contractor shall guarantee the sod under the payment and performance bond in accordance with Article 109-10 of the *Standard Specifications*.

The observation period for sod installed between August 31 and March 1, shall not begin until March 1. Installation of sod shall be permitted between August 31 and March 1. However, the Engineer shall not accept such work and begin the observation period prior to March 1. Upon satisfactory completion of work and acceptance by the Engineer, the observation period shall begin.

After the first 30 days of the observation period, and every 30 days thereafter throughout the observation period, the Contractor and Engineer shall meet to review the project and identify dead or damaged sod to be replaced. The Contractor, at no additional expense to the Department, shall satisfactorily replace any sod that is not in a living and healthy condition as determined by the Engineer. Replacement sod shall be furnished and installed in accordance with the same requirements as for initial sodding operation, except that the amounts of limestone, sulfur, and water may be readjusted as directed. Satisfactory replacement of sod shall begin within 10 days of notification. Failure to replace and repair damaged or dead sod as directed may result in sanctions

under Article 108-7 or Article 108-8 of the *Standard Specifications*. Upon completion and acceptance of the sod repairs, the next 30 days of the observation period shall begin.

(E) Acceptance

At the end of the observation period, the sod furnished and installed under this contract must be in a living and healthy condition, as determined by the Engineer. Acceptance of sod will be either at the end of the observation period or at final acceptance of the project, whichever is later. The sod shall be weed free at time of final acceptance.

Measurement and Payment

Sodding will be measured and paid for in accordance with Article 1664-5 of the *Standard Specifications*.

Water will be measured and paid as described in the Landscape Design Special Provision titled "Water for Planting".

Sodding . . . . . Square Yard

RIVER STONE

General: The work covered by this item consist of furnishing and installing 'River Stone' as shown on the plans, the details, and as described herein.

Materials: River Stone will consist of washed river jacks, Tennessee river gravel, or approved equal available from local North Carolina sources in a size range of approximately 2 to 6 inches in length by 1 to 4 inches in width and no more than 3 inches in depth. The River Stone will be applied at a depth of 12 inches at locations shown on the plans and as directed by the engineer in the field. The River Stone mulched areas will be underplayed with landscape fabric (sample to be approved by the engineer). The cost of the landscape fabric will be incidental to the cost of the River Stone.

A representative sample and the source of the River Stone will be submitted for the Engineer's approval prior to delivery and placement.

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Method of Measurement and Basis of Payment: The work of furnishing and installing the River Stone mulch as shown on the plans and as approved by the Engineer, when completed and accepted, will be paid for at the unit price per ton for "River Stone". 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 for installation, coordination with engineers and any other incidentals necessary or required to complete the work.

Payment will be made under:

River Stone . . . . . Ton

STEPPING STONE

General: The work covered by this item consist of furnishing and installing 'Stepping Stones' as shown on the plans and as described herein.

Materials: The Stepping Stone will consist of Tennessee flagstone or fieldstone, or approved equal available from local North Carolina source. The stone shall be similar in color and consistency as all other river stone or boulders used on the site. The stone shall be irregular in shape and size, but approximately 2' x 2' but not to exceed 3' in width or length. The stone shall be a minimum of 2" thick. The stepping stone will be placed on a aggregate base for leveling and stability. The cost of the aggregate will be incidental to the cost of the Stepping Stone.

A representative sample and the source of the Stepping Stone will be submitted for the Engineer's approval prior to delivery and placement.

Method of Measurement and Basis of Payment: The work of furnishing and installing the Stepping Stone as shown on the plans and as approved by the Engineer, when completed and accepted, will be paid for at the unit price per each "Stepping Stone". 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 for installation, coordination with engineers and any other incidentals necessary or required to complete the work.

Payment will be made under:

Stepping Stone. . . . . EA

BOULDERS

General

This special provision consists of furnishing and installing the boulders as shown on the plans and details and as described herein.

This pay item is separate and independent of the stone used for the waterfall.

Materials

Boulders will be of natural stone and rounded in shape. Size, color and shape will be the selection of the Engineer at a source to be approved by the Engineer. Backfill will be as specified for landscape grading with 1/3 of boulder buried below grade.

Installation

Placement of boulders will be at the direction of the Engineer and will require the cooperative effort of the contractor to maneuver into the desired position. Excavate and place boulder so that it sits embedded in the plant bed and not on top. Backfill around boulder with plant bed media or landscape graded areas. Boulders shall be placed at locations shown on plans or as designated by the Engineer at appropriate stages of construction. Contractor shall supply to the Engineer a staging plan showing the time frame of installment of stones and how he will not damage any existing and proposed hardscape (i.e. Roadway, sidewalks…)

The size of boulders shall be:

Small Boulders – 5 CF-10 CF (10 boulders)

Medium Boulders – 15 CF-25 CF (10 boulders)

Large Boulders – 30 CF-40 CF (10 boulders)

See the Landscape Plans(L7&L14)

Care shall be taken during transport, delivery and placement to prevent chipping, cracking or scarring of surfaces. Boulders shall be placed in such a way so that they will be immovable and will not roll.

Compensation

'Boulders' will be paid for each that have been delivered to site, installed and accepted.

The work of furnishing and installing boulders, when completed and accepted, will be paid for at the contract unit price per each 'Boulder'- installed.
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.

Payment will be made under:

Boulder . . . . . EA

WORMSTYLE FENCING

General:

The work covered by this special provision consist of furnishing and installing the split rail fencing as shown on the plans or as directed by the Engineer.

Materials: The split rail fencing shall have a total of three rails. Fence posts and rails shall be locust- wood post and cedar- wood rails. They shall be free of major defects or chips or splinter pieces that may cause injury to pedestrians. Post and rails shall be straight and true to line and grade.

Installation: Fence shall be erected as shown on the plans and according to manufacturer's recommended installation. Post installation shall be set in with an aggregate base bottom-set plum. Rails shall be straight and true to line and grade. Installer shall be an experienced fence builder with a minimum of seven years' experience. **Prior to beginning construction of fences a 24' sample fence shall be constructed in a discreet area designated by engineer for approval.**

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Method of Measurement

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

Basis of Payment

The quantity of split rail fencing, measured as specified above, will be paid for at the contract unit price per linear foot for "Wormstyle Fencing". There will be no separate pay item for post .Such price and payment will be full compensation for furnishing and installing the split rail fencing; including and not limited to all materials, labor, and equipment necessary to satisfactorily complete the work.

Payment will be made under:

Wormstyle Fencing ..... Linear Feet

OUTDOOR PARK STOVE

General: Outdoor Park Stoves shall be furnished and constructed on concrete foundations in accordance with details in the plans and shall be located as shown on the plans or as directed by the Engineer.

Outdoor Park Stoves shall be the product of a manufacturer regularly engaged in the design and manufacture of Park Stoves. Submit six (6) copies of shop drawings or submittal data to Engineer for approval. (See Park Stove Detail Sheet for size, design, material, etc.).

Method of Measurement:

The quantity of stoves to be paid for shall be the actual number of Outdoor Park Stoves with foundation slabs, complete in place and accepted.

Basis of Payment:

Stoves, measured as provided above, shall be paid for at the contract unit price each for Outdoor Park Stoves. Such price and payment will be full compensation for the work of

"Outdoor Park Stove," including but not limited to, furnishing all labor, materials, tools, equipment and all incidentals necessary to complete the work.
Payment will be made under:

Payment will be made under:

Outdoor Park Stove ..... EA

SPECIAL REST AREA SIGNAGE

General:

The work covered by this item consists of furnishing and installing the Special Rest Area Signage in accordance with the dimensions and finishes as shown on the plans, the details, and as described herein and the provisions described in Section 901 NCDOT Standard Specs.

Signage:

The signs will be sandblasted redwood or equivalent accepted by engineer. The fabricator will be an experienced sign maker with a minimum of 7 years of sandblasted redwood fabrication experience. **The fabricator will furnish examples and references of work of a similar nature done within the past 3 years. All signs will be backed with aluminum metal as prescribed in section 901. Ensure manufactures attachment process is utilized to attach redwood signage to the aluminum backing.** See **Site Signage Plan** for details. The artwork for the aluminum portion shall utilize silk screening processes described in section 901.

Fabricator will produce artwork as indicated on the plans and submit along with font choices for selection and approval prior to constructing sign. A full-scale mockup of the signs in appropriate dimensions and colors will be submitted for approval prior to production. Final decisions on colors will be made when full scale mock up is submitted to ensure visibility and readability.

Fabricator's instructions for mounting along with all hardware will be furnished with each sign, unless furnished as spare signboard.

Signs and quantities are located on the Site Signage detail sheet (LD15)

Installation of the ***'Welcome to NC Mountains'*** sign requires construction of two 20" square stone columns as shown on details. Stone veneer and cap will be same as used for stone seatwalls, the building and sills, and the stone surround on picnic shelter columns. (See Stone Seatwall Special Provision.)

Excavate and pour reinforced concrete footing, build stone column and place Bluestone cap with continuous wire reinforcement as shown on the drawings. Place reinforcing steel as described in Section 425. Allow the masonry to cure a minimum of 7 days prior to placing backfill. All applicable sections of the Standard Specifications Section 825, Incidental Concrete Construction, will apply.

All other signs will be installed on post of pressure treated lumber in sizes and at mounting heights as indicated on the details and as directed by the Engineer in the field. Ensure proper mounts for aluminum signage as described in section 901 are utilized to mount to treated lumber.

Method of Measurement and Basis of Payment: The work of selecting an experienced fabricator and constructing the rest area signage as shown on the plans or as approved by the Engineer, when completed and accepted, will be paid for at the unit price per lump sum for "Special Rest Area Signage". 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 for installation, coordination with engineer and sign fabricator for artwork review and any other incidentals necessary or required to complete the work.

Payment will be made under:

Special Rest Area Signage.....LS

BOULDER WATER FEATURE

GENERAL:

The work required under this section consists of construction of the boulder waterfall feature that is noted in the plans, details and as specified herein.

The scope of work included in this section includes the furnishing of all materials, equipment and services necessary for the completion of the described waterfall system.

The furnishing and installation of materials shall include but not be limited to the following items:

a. Water supply plumbing, pipes accessories and equipment.
b. Basin overflow drain lines and equipment, and all associated materials.
c. All boulders, river stone and associated masonry work.
d. Submersible Pumping Equipment.
e. Liners, bulkhead fittings, waterproofing materials and equipment.

f. All supplemental river rock.
g. System Controls, timers, and utility access box(es).
h. Waterfall weir, cap stone, fittings, nozzles and associated equipment.
i. Utility Service connection and coordination for power fill water, and sewer.
j. Stream side plants, planting medium, plant basket and associated material.
k. Special Tools.

COORDINATION:

The installing Contractor(s) shall coordinate and schedule the waterfall contract work with all other associated project work.

Placement of boulders will be at the direction of the Engineer and will require the cooperative effort of the contractor to maneuver into the desired position. Excavate and place boulder so that it sits embedded in the plant bed and not on top. Backfill around boulder with plant bed media or landscape graded areas. Boulders shall be placed at locations shown on plans or as designated by the Engineer at appropriate stages of construction. Contractor shall supply to the Engineer a staging plan showing the time frame of installment of stones and how he will not damage any existing and proposed hardscape (i.e. Roadway, sidewalks…)

QUALITY ASSURANCE:

Approved Boulder Waterfall Contractor:

1. The contractor responsible for the construction and completion of the pondless waterfall shall have extensive experience with the installation, construction and maintenance of waterfalls, water features and/or ponds. They shall have completed a minimum of 5 project installation similar in nature and scope as defined in this project. They shall offer proof of workmanship, accreditation, and photographic samples of their work.

2. Plans, details and pictures of the contractor's previous work will assist in the process and discussion of how the proposed pondless waterfall feature will be constructed.

Approved Equipment Supplier:

1. The design shown on the drawings and the specifications listed herein are based on the design data, services, and materials readily available through national suppliers of pond, waterfall, fountain, and plumbing materials.

2. The contractor shall use only reputable equipment suppliers approved by the Engineer.

Boulder Waterfall Materials and Equipment:

A pre-construction meeting shall be arranged with the general contractor for the coordination of the contractor responsible for the boulder waterfall construction. This allows for a detailed explanation of the suggested installation techniques and the sequence of the installation.

PUMP:

1. Pump capacity: 3500 GPH; plumbed with a manual ball valve (in feeder line at spillway; placed in valve box) to restrict flow if necessary.

2 Acceptable manufacturers: Cal, Tsurumi, Aquascape, Myers or approved equal.

3. Two year manufacturer warranty (minimum).

4. Low water cutoff switch.

5. Plumbed to allow for removal without entering tank.

6. Connected to power supply by power cable within valve box.

7. Contractor supplies plug in exterior grade timer (pump plugged in to timer within valve box).

ROCK, STONE, AND BOULDERS:

1. It is the responsibility of the boulder waterfall contractor to supply all river rock, stone and boulders for the completion of the waterfall and adjoining areas.

2. Multiple sizes and grades of river stone and boulders shall be integrated within the design in order to give the stream, waterfall and the immediate surrounding area a realistic and natural mountain stream character.

3. The boulders supplied shall range in size from large (approx. 40-50 CF), medium (30-40 CF) and small (2-3 CF). A minimum of three additional larger boulders shall be provided and placed for sitting rocks adjacent to the boulder feature (as noted in the plans and details).

4. The river stone supplied shall range in size from large (4"-8"), medium (2"-4") and small (1/2" -2").

Final start-up and adjustment meeting shall be provided for the proper adjustments to be made to the boulder waterfall system to meet the performance levels established. It is also the time to familiarize the maintenance staff of the correct procedures to operate the boulder waterfall system equipment. Before final inspection of the water feature all the following items need to be complete:

a. Electrical connections made and tested.

b. Hydraulic piping and fittings complete and tested for leaks, repaired if necessary, and flushed clean.

c. The water basin cleaned and filled to the correct operating depth.

Job site visits by NCDOT project engineers and designers can be made during certain construction phases of the project.

INDUSTRY STANDARDS AND APPLICABLE CODES:

A. The materials shall be installed in accordance with all applicable provisions of the most recent edition of the following:
   ANSI
   ASTM
   ASSE
   ASME
   AWWA
   CS
   NEMA
   NSF
   UL
   NEC
   OSHA
   NFPA
   American National Standards Institute
   American Society for Testing and Materials
   American Society of Sanitary Engineering
   American Society of Mechanical Engineers
   American Water Works Association
   Commercial Standards
   National Electrical Manufactures Association
   National Sanitation Foundation
   Underwriters Laboratory
   National Electric Code
   Occupational Safety and Health Act
   National Fire Protection Agency
   Other state or local code(s) which are applicable

B. The above referenced guidelines shall be considered minimum standards for the materials or the installation practices applicable for the pondless waterfall system.

SHOP DRAWINGS AND SUBMITTALS:

The plumbing and water supply systems noted on the plans shall be considered schematic in design. Final design specifications shall be defined and supplied by the contractor, in keeping with the contract work, noted minimum specifications, and in coordination with all other applicable site work.

A. The contractor shall submit drawings in accordance with the conditions of the Contract Specification section describing the size(s), location(s), and installation details of the interconnecting piping, waterfall management equipment and electrical systems.

B. The Landscape Architect may add other drawings during the period of construction as required for clarification.

C. This specification shall be considered an integral part of the accompanying drawings. Anything omitted from one and embodied in the other is considered essential to the contract and must be furnished by the Contractor.

D. All pertinent data on any substitute system(s), including engineering performance calculations on the pumping system(s), drainage, equipment, and electrical system diagrams and schematics shall be provided to Engineer for review and evaluation.

E. Submittals for the pump, liner, underlayment, bulkheads, sealants, pump vault, waterfall weir shall be provided to the Engineer/Landscape Architect for review and approval.

F. Material submittals for the boulders, flat waterfall rocks and river stone shall be from a single supplier. The landscape architect can approve the material on site, or if feasible, visit the supplier for approval at the source.

G. Submittals shall be rejected if they are difficult to read due to poor image, drafting quality, insufficient scale, or missing data.

Submittals shall include the following:

- Shop drawings and product information for all equipment and materials furnished.
- complete Material list.
- Equipment space layout showing all electrical and mechanical equipment in addition to all piping and conduit.
- Installation details for each piece of equipment being provided.

SUBSTITUTIONS:

A. Submittals for equal items shall include the following information where applicable:

1. Operation Design Description.

2. Component materials and finishes.

3. Pump curve(s).

4. Certification of conformance with specified codes and standards.

B. Proposed substitutions for equipment or material must be submitted within (30) working days prior to construction for consideration as approved equals. Proposals for substitutions shall be made only by the prime bidders in writing to Engineer and sub-contractors shall not make any proposals to the Landscape Architect for substitution.

1. All equipment supplied to the Contractor shall be supplied by reputable pond or plumbing equipment suppliers unless otherwise approved.

C. Submittals of equal systems or components may be rejected by the Engineer or Landscape Architect if it found not to meet the minimal criteria set forth in the plans, contract or specifications.

GENERAL INSTALLATION:

A. Protect all pipes, conduits, equipment and other parts of the work against Injury by exposure to the weather while stored, during construction, or after installation.

B. Install and connect all equipment in accordance with manufacturer's instruction and recommendations unless otherwise noted. If specified installation is contrary to the manufacturer's instruction, cease installation of affected components or systems and notify the Engineer.

C. Accurately place all large stones and boulders to rigidly support additional weight without displacement, movement or rolling.

PIPE INSTALLATION:

A. General installation:

1. Make all pipe runs as direct as possible using a minimum number of fittings.

2. Flexible PVC pipe, sized and approved for the specified flow and pressure, shall be used for the feeder pipe to the waterfall weir. It shall be buried at an approved depth and/or protected from puncture or damage.

3. Cut all pipe and tubing ends square. Remove rough edges and burrs to create a smooth unobstructed flow.

4. Protect all openings in piping during construction to prevent entrance of foreign matter.

5. All connections shall be made with manufacturer approved adhesives, joint compounds or fittings.

GUARANTEE:

A. The waterfall Contractor(s) shall issue a guarantee that any equipment found defective within one (1) year of the final acceptance shall be replaced at no cost to the Department.

B. The guarantee does not extend to damage incurred through operation and maintenance by the Owner. The Owner will assume full responsibility for the proper operation and maintenance of the waterfall upon final acceptance. Mechanical waterfall systems shall be furnished by the Contractor unless otherwise specified.

C. The contractor shall guarantee all plant material to be living and in sufficient health within one (1) year of the final acceptance or shall be replaced at no cost to the Department.

Basis of Payment:

Basis of payment for this item of work will be the lump sum price for the installation of the "Boulder Water Feature" The above prices and payments will be full compensation for all work covered by this section.

Payment will be made under:

Boulder Water Feature .....Lump Sum

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SEEDING AND MULCHING
BLUEGRASS FESCUE MIX
REST AREA LAWN : **(West)**

Seeding and Mulching shall be performed in areas identified as "Seeded – Roadside Mix" on the Landscape Plans. The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in pounds per acre.

August 1 - June 1		**May 1 - September 1**	
20#	Kentucky Bluegrass	20#	Kentucky Bluegrass
75#	Hard Fescue	75#	Hard Fescue
25#	Rye Grain	10#	German or Browntop Millet
500#	Fertilizer	500#	Fertilizer
4000#	Limestone	4000#	Limestone

Approved Kentucky Bluegrass Cultivars:

Adelphi	Brilliant	Kenblue	Princeton
Apollo	Bristol	Liberator	Ram I
Bariris	Challenger	Merit	Rugby
Baron	Columbia	Nuglade	Sydsport
Baronie	Fylking	Odyssey	Touchdown
Bartitia	Glade	Plush	Vantage

Approved Hard Fescue Cultivars:

Aurora	Minotaur	Scaldis	Waldina
Bardur	Nordic	Spartan	Warwick
Crystal	Reliant	Valda	

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

General:

Prepare seedbed, furnish, place and incorporate limestone, fertilizer, and seed; rake, mulch, mow and perform other operations necessary for the permanent establishment of vegetation from seed on areas exposed due to construction operations. Adapt operations to variations in weather or soil conditions as necessary and as directed by the Engineer for the successful establishment and growth of the turf.

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Installation:

Remove existing vegetation. Remove all construction debris, concrete, rocks, wood, brick, etc. that will interfere with turf establishment. Loosen soil to a depth of not less than 5 inches. Break up any clods and work top 2 to 3 inches of soil to prepare an acceptable seedbed. Shape and smooth any uneven or rough surfaces. Do not prepare soil when ground is frozen, extremely wet or in an otherwise unfavorable working condition. Fertilizer and Limestone may be applied as part of or after the seedbed preparation. If applied after seedbed has been prepared, rake to thoroughly mix into soil.

Distribute seed uniformly over the seedbed at the required rate of application and immediately rake to cover seed with a layer of soil. Apply mulch in a light but uniform layer that allows some sunlight penetration and air circulation but heavy enough to provide some shade to the soil/seed layer and conserve soil moisture. Hold mulch in place with a binding material specifically manufactured for this purpose if requested by the Engineer. Maintain areas in a satisfactory condition until the project is completed. Repair any areas that are disturbed with subsequent construction operations to the satisfaction of the Engineer.

Compensation:

The work described above will be measured over the surface of the ground and will be paid for at the contract unit price per acre for ' **Seeding & Mulching Bluegrass Fescue Mix Rest Area Lawn** ' when properly installed and accepted. Repair of seeded and mulched areas will be incidental to this work and additional compensation will not be made.

Payment will be made under:

Seeding & Mulching Bluegrass Fescue Mix Rest Area Lawn . . . . . ACRE

3/4 INCH POST-TYPE YARD HYDRANT

General: The work covered by this item shall consist of furnishing, connecting and installing 3/4 inch post-type yard hydrants complete with 4" x 5'x 5' concrete pad, valve(s), and waste drainage to catch basin as shown on the plans and as specified herein. The Contractor shall supply six (6) copies of shop drawings and specifications for the post-type yard hydrant proposed to furnish, for approval by the Engineer.

Materials and Construction

Post-type yard hydrants shall be a non-freeze proof design for a minimum burial depth of 30 inches. (Note: Each hydrant shall have a screw on vacuum break at the nozzle).

Gate valve, valve box, and pipe shall be provided to complete the installation of yard hydrant.

The locations for post-type yard hydrants as shown on the plans are substantially correct; however, the exact location will be established by the Engineer.

Details showing dimensions, mounting height, foundation slab, pipe sizes, waste drainage and other items are as shown on the plans.

Sterilizing and Flushing 3/4 Inch Post-Type Yard Hydrants

Sterilizing and flushing as specified for "Water Line Construction" shall be done as part of the work of completing 3/4 inch post type yard hydrants.

Method of Measurement:

The quantity of post type yard hydrants to be paid for will be the actual number of 3/4 inch post type yard hydrants with 4"x 5'x 5' concrete pad ,Gate valve, valve box, and water supply pipe and waste drainage piping to catch basin ,complete in place and accepted.

Basis of Payment:

3/4 inch Post-Type Yard Hydrants measured as provided above will be paid for at the contract unit price each for "3/4 Inch Post-Type Yard Hydrants", including but not limited to, furnishing all labor, materials, tools, equipment, and all other incidentals necessary to complete the work.

Payment will be made under:

3/4 Inch Post-Type Yard Hydrant . . . . . EA

PICNIC SHELTER AND SINGLE PICNIC TABLE - STONE VENEER BASE

General: The work covered by this provision consists of furnishing and constructing a single picnic table with concrete pad and a picnic shelter with table and concrete pad (Handicapped Accessible) as shown on the drawings and herein specified; including all labor, materials, services and incidentals required to complete the work.

Site Preparation: After picnic shelter and picnic table locations and orientation are staked and approved by the Engineer, perform any necessary clearing and grubbing in accordance with Section 200 "Clearing and Grubbing" of the Standard Specifications. Grade area for the concrete pad level with drainage swale cut on high side and fill on low side as shown on the details to achieve positive drainage around the pad.

Picnic Shelters Concrete and Steel:
Use Class "B" concrete in all footings and concrete pad. All concrete and all structural and reinforcing steel will comply with applicable portions of Section 825 'Incidental Concrete Construction – General'; Section 1070, 'Reinforcing Steel'; and Section 1072 'Structural Steel' of the Standard Specifications.

Include all fasteners, anchors, ties, gusset plates, etc., as required. Use ½ inch hot-dip galvanized steel thru bolts in diameter and length as required. Install with steel galvanized washers under both bolt head and nut, except for gusset plates; galvanizing will conform to all applicable requirements of Section 1076 of the Standard Specifications.

Stone Veneer for Picnic Shelter columns:
A 28" square stone surround will be constructed around each column of the picnic shelter. Stone veneer will match building and stone seatwalls-SEE Special Provisions secured to the 16" square CMU column. Stone used to construct surround will match proposed Seatwalls and columns on "Welcome to the NC Mountains" sign (See Stone Seatwall Special Provisions.)

Excavate and pour reinforced concrete footing, construct CMU column, build stone surround and place Bluestone cap with continuous wire reinforcement as shown on the drawings. Place reinforcing steel as described in Section 425. Allow the masonry to cure a minimum of 7 days prior to placing backfill. All applicable sections of the Standard Specifications Section 834, Block Masonry, will apply. Look of stone veneer for picnic shelter columns will match/coordinate with stone work in retaining wall.

Carpentry and Millwork:
Grading of all lumber, plywood and trim will conform to the association under whose rules it is graded. Moisture content will not exceed 18 percent for framing lumber and 12 percent for millwork and trim.

All lumber in contact with concrete or masonry, and/or soil will be treated in accordance with standards of the American Wood Preserver's Association. Minimum retention will be 0.25 pcf for material 2 inches and smaller and 0.40 pcf for materials greater than 2 inches.

Store all lumber and millwork in a manner that will keep it dry and well ventilated, well off the ground, and adequately covered.

All timbers, rafters and fascia will be full size, rough-cut No. 1 southern yellow pine, thru-bolted where shown on drawings and securely spiked together at all other joints. Stain all timbers, rafters, fascia and underside of roof decking. The Engineer will select color from samples furnished by the contractor.

Coat section of treated wood columns in footing with asphalt paint as shown on drawings. Asphalt paint shall not be visible above concrete footing.

Roof decking will be single tongue and groove, 2 inches by 6 inches with V- Joints on face side, kiln-dried No. 1 southern yellow pine. Double spike each member every rafter.

Framing rafters and fascia will be cut square on bearings, closely fitted, accurately set to required lines and levels, and rigidly secured in place.

Moisture Protection
Roof will be same material used on the Rest Area facility (SEE Architectural Specs for details). Ensure same construction processes utilized at Rest Area roofing are maintained to ensure continuity and quality are the same.

Picnic Table (Terrazzo and Steel)

General
The picnic table will include site preparation, grading, concrete footing, welded tubular steel frame with a terrazzo table top and wood benches, all hardware required for assembly and other incidentals as necessary for complete installation in accordance with the details and as described herein.
The Engineer reserves the right to inspect the frames and tops at the place of manufacture in accordance with Section 106-6 of the Standard Specifications.

Submittal
Submit shop drawings for table frames, aluminum benches, and terrazzo table tops.
Submit color chart on paint coatings to be used on table and bench steel frames to the Engineer for finish and color selection.

Concrete and Steel

Use class "B" concrete in all table footings and concrete pad. All concrete and all structural and reinforcing steel will comply with applicable portions of Section 825, 'Incidental Concrete Construction – General'; Section 1000, 'Portland Cement Concrete Production and Delivery'; Section 1070 'Reinforcing Steel'; and Section 1072 'Structural Steel' of the Standard Specifications.

Benches

Aluminum Benches - nominal size 2" x 10" – use underside aluminum mounting clips.

Terrazzo Tops

Terrazzo tabletops will conform to the following specifications:

1. Scope: provide pre-cast terrazzo tops for picnic tables. Include inserts and bolts as indicated on drawings.

2. Materials:
   A. Portland Cement will comply with all applicable requirements of Section 1024, 'Materials for Portland Cement Concrete', of the Standard Specifications.
   B. Sand will be clean and free from organic matter and will meet the requirements of 4S mortar sand, from Table 1005-1, 'Aggregate Gradation', of Section 1005, 'General Requirements for Aggregate' of the Standard Specifications.
   C. Marble chips will be of the size, colors and kinds required by the color plate as specified herein; chips will have abrasive hardness not less than 13 as determined by the method described in the National Bureau of Standard BMS Report No. 98.
   D. Terrazzo sealing solution will produce a waterproof film on surface and seal moisture in terrazzo. Cleaning solution will not cause yellowing of terrazzo or leave tacky finish on the surface after buffing.
   E. Terrazzo cleaning solution will be a neutral chemical cleaner that will not change the color of the terrazzo or damage it in any way.

3. Terrazzo Composition and Colors:
   A. Terrazzo tops will be of colors and composition as shown in Terrazzo Plant Catalog of the National Terrazzo and Mosaic Association, Inc. Mix terrazzo in accordance with formulas and specifications for Plate 129.

4. Production of Tops:
   A. Mix chips so that the finish surface has 80 percent aggregate showing.
   B. Perform initial and final grinding with abrasive grit stone of proper size to obtain the finish specified. After curing terrazzo topping, by keeping damp for 6 days (or less if it has set enough to grind without loosening of chips),

grind surfaces with electric machine. After initial grinding or rubbing, grout surfaces with neat Portland Cement paste of creamy consistency, filling all voids; use Portland Cement and coloring corresponding to existing topping for grouting. Let grout remain on surfaces until final grinding, but not less than 2 days.

C. Final grinding will produce surface of same color and texture as Plate 129 as specified in Item 3 above. Surfaces will be smooth and free from imperfections. In no case will terrazzo show a wave exceeding 1/16" when tested with straight edge.

5. Cleaning and Sealing Terrazzo:
   A. After final grinding, apply cleaning solution to terrazzo in accordance with the manufacturer's directions. After surfaces are dry, wash and rinse terrazzo and apply a coat of sealing solution. Buff terrazzo with electric machine and leave in clean and finished condition.

6. Installation of Table Tops:
   A. Bolt top in place without binding.
   B. Clean tops of grease, dirt, etc., and apply two (2) additional coats of sealing solution, buff with electric machine and leave in clean and finished condition.
   C. Leave top in good condition. Chipped tops, rough or chipped edges and cracked slabs will not be accepted.

7. Painting of Steel Frame:

   Exterior Steel – Use one coat factory priming exterior rust resistant metal primer, then use two coats of epoxy glaze coating, gloss finish.

   NOTE: Painter will spot check a small area with a second coat to determine if primer "lifts off". If it does, obtain from the paint factory a second coat that will not lift from the priming coat actually used by the factory.

Concrete Pad

Use Class "B" concrete. All concrete and structural and reinforcing steel will comply with applicable portions of Section 825 'Incidental Concrete Construction – General'; Section 1000, 'Portland Cement Concrete Production and Delivery'; Section 1070, 'Reinforcing Steel'; and Section 1072 'Structural Steel' of the Standard Specifications.

Form and pour concrete pad to dimensions and with slope as shown in details.
Give concrete pad the same finish as sidewalks. Do not place backfill until at least 3 curing days have elapsed. Compact backfill to a degree comparable to the adjacent undisturbed material.

Compensation

The work of furnishing and installing the **'Picnic Shelter, Single Picnic Table, Stone Veneer Base'** when completed and accepted, will be paid for at the contract unit price each for **Picnic Shelter, Single Picnic Table, Stone Veneer Base'**. The work of furnishing and installing the 'Picnic Table, Terrazzo and Steel', when completed and accepted, will be paid for at the contract unit price each for **'Picnic Table, Terrazzo and Steel'.**
There will be no separate payment for the concrete pads.

Note: Picnic Shelter with Handicapped Table as shown on the plans will be paid for at the same unit cost as "Picnic Shelter, Single Picnic Table, Stone Veneer Base'. Such price will be full payment for each Picnic Shelter, Single Picnic Table, Stone Veneer Base' including but not limited to, all labor, materials, and any other incidentals necessary or required to complete the work.

Payment will be made under:

Picnic Table, Terrazzo & Steel..... EA
Picnic Shelter, Single Picnic Table Stone Veneer Base .....EA

CONCRETE CURB RAMP

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

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

Payment will be made under:

Concrete Curb Ramp.....EA

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SPECIAL SIDEWALK CULVERT

General: The Special Sidewalk Culvert will be constructed at the location shown on the Site and Grading plans (L4&L5), as indicated in the details and as described herein. All applicable sections of the Standard Specifications Section 310 Pipe Culverts, Standard Specifications Section 838 end walls, and Incidental Concrete Construction - General and Section 848, Concrete Sidewalks, Driveways and Wheelchair Ramps, will apply. Place Stone Veneer utilized at building on face of both end walls as shown on Special Sidewalk Culvert detail (SEE-LD2)

Method of Measurement and Basis of Payment: The Special Sidewalk Culvert will be paid for as Lump Sum for 'Special Sidewalk Culvert. Such price will be full compensation for all labor, materials, tools, equipment, and all other incidentals necessary to complete the work.

Payment will be made under:

Special Sidewalk Culvert.....Lump Sum ✓✓

WHEEL STOPS @ HANDICAP PARKING

Material:

Precast Concrete Wheel Stops = 8 feet (8') in length –made of 4000 psi air-entrained concrete. Each stop shall be reinforced with two No. 4 deformed steel reinforcing bars, minimum. Provide chamfered corners and drainage slots on underside; provide stops of half octagonal configuration in shape and holes for dowel-anchoring to substrate

Installation:

Securely attach wheel stops into at-grade concrete or asphalt pavement with not less than two 5/8" dia. galvanized steel dowels 10-inches in length embedded in holes, cast in wheel stops. Attach dowel to wheel stop and to pavement.

Submit shop drawings of Precast Concrete Wheel Stops, including installation details and attachment details to at-grade concrete and asphalt pavement, for approval.

Method of Measurement and Basis of Payment: "Wheel Stops @ H/C Parking" will be paid for as Each Such price will be full compensation for all labor, materials, tools, equipment, and all other incidentals necessary to complete the work.

Payment will be made under:

Wheel Stops @ H/C Parking .....Each ✓✓

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

DIVISION FOURTEEN

DISTRICT TWO

County:	HAYWOOD
Contract No.:	6300032896
WBS Element:	41534.1.1
T.I.P. No.	K-5002
Description:	HAYWOOD COUNTY REST AREA RENOVATION & NEW BUILDING ON US 2374
Project #	C203202-RA
Architect	Weeks Turner Architecture, PA Raleigh, NC (919) 779-9797 Ginger Anderson, Architect
Structural Engineer	Lysaght & Associates Raleigh, NC (919) 833-0495 Pat Kyzer, PE
Plumbing, Mechanical & Electrical Engineer	Burke Design Group, PA Raleigh, NC (919) 771-1916 Ben Burke, PE

GINGER S. ANDERSON REGISTERED ARCHITECT 11075 NORTH CAROLINA RALEIGH, NC

11-1-

NORTH CAROLINA PROFESSIONAL SEAL 18123 ENGINEER PATRICK M. KYZER

11/1/13

NORTH CAROLINA PROFESSIONAL SEAL 22038 ENGINEER BENJAMIN E. BURKE

11/1/13

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SECTION 01026 - PAYMENT AND COMPLETION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 CONTRACT CONDITIONS

A. See the conditions of the contract for additional requirements.
B. Progress payments will be made on or about the 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 01100- COMPENSATION FOR GENERAL CONSTRUCTION -- (SBL)

HIGHWAY US-23/74 (SOUTHBOUND LANE **(SBL)**) REST AREA
FEBRUARY 2014
HAYWOOD COUNTY, NORTH CAROLINA

1.1 COMPENSATION

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

"General Construction of **(SBL)** Rest Area Building"……Lump Sum

"General Construction of **(SBL)** Storage Building"……Lump Sum

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HIGHWAY US-23/74 (SOUTHBOUND LANE **(SBL)**) REST AREA
FEBRUARY 2014
HAYWOOD COUNTY, NORTH CAROLINA

DIVISION 15A- COMPENSATION FOR PLUMBING -- **(SBL)**

COMPENSATION

A. The work of furnishing materials and constructing the Plumbing installation for the**(SBL)** Rest Area Building and the **(SBL)**Storage Building Yard Hydrant in accordance with the plans and specifications, completed and accepted, will be paid for at the contract lump sum price for the "Plumbing Installation of**(SBL)** Rest Area Building". Such price and payment will be full compensation for all work of constructing the Plumbing installation for the **(SBL)**Rest Area Building as well as the **(SBL)**storage building yard hydrant, except for the Solar Water Heating System, including but not limited to furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work. Payment will be made under:

"Plumbing Installation of **(SBL)**Rest Area Building"……Lump Sum

B. The work of furnishing materials and constructing the Solar Water Heating System for the **(SBL)**Rest Area Building in accordance with the plans and specifications, compete and accepted, will be paid for at the contract lump sum price for "**(SBL)**Rest Area Solar Water Heating System". Such price will be full compensation for all work of constructing the Solar Water Heating System, including but not limited to furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work. Payment will be made under:

"**(SBL)**Rest Area Solar Water Heating System"……Lump Sum

HIGHWAY US-23/74 (SOUTHBOUND LANE **(SBL)**) REST AREA
FEBRUARY 2014
HAYWOOD COUNTY, NORTH CAROLINA

DIVISION 15B- COMPENSATION FOR MECHANICAL **(SBL)**

COMPENSATION

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

"Mechanical Installation for**(SBL)** Rest Area Building"……Lump Sum

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HIGHWAY US-23/74 (SOUTHBOUND LANE **(SBL)**) REST AREA
FEBRUARY 2014
HAYWOOD COUNTY, NORTH CAROLINA

DIVISION 16- COMPENSATION FOR ELECTRICAL **(SBL)**

COMPENSATION

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

"Electrical Installation for **(SBL)**Rest Area Building"……Lump Sum

"Electrical Installation for **(SBL)**Storage Building"……Lump Sum

SECTION 01101- COMPENSATION FOR GENERAL CONSTRUCTION -- (NBL)

HIGHWAY US-23/74 (NORTHBOUND LANE **(NBL)**) REST AREA
FEBRUARY 2014
HAYWOOD COUNTY, NORTH CAROLINA

SECTION 13000- COMPENSATION FOR GENERAL RENOVATION -- **(NBL)**

1.1 COMPENSATION

A. The work of furnishing materials and Renovating the **(NBL)**Rest Area Building in accordance with the plans and specifications, completed and accepted, will be paid for at the contract lump sum price for the "General Renovation of **(NBL)**Rest Area Building", Such price and payment will be full compensation for all work of Demolition ,Compacted Backfilling for new concrete Building Slab and Renovating the **(NBL)**Rest Area Building, including but not limited to furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work. Payment will be made under:

"General Renovation of **(NBL)** Rest Area Building"……Lump Sum

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HIGHWAY US-23/74 (NORTHBOUND LANE **(NBL)**) REST AREA
FEBRUARY 2014
HAYWOOD COUNTY, NORTH CAROLINA

DIVISION 15A- COMPENSATION FOR PLUMBING -- **(NBL)**

COMPENSATION

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

"Plumbing Installation of **(NBL)**Rest Area Building"……..Lump Sum

B. The work of furnishing materials and constructing the Solar Water Heating System for the **(NBL)** Rest Area Building in accordance with the plans and specifications, compete and accepted, will be paid for at the contract lump sum price for "**(NBL)** Rest Area Solar Water Heating System". Such price will be full compensation for all work of constructing the Solar Water Heating System, including but not limited to furnishing all transportation, materials, labor, tools, equipment, fees and incidentals necessary to complete the work. Payment will be made under:

"**(NBL)**Rest Area Solar Water Heating System"……..Lump Sum

HIGHWAY US-23/74 (NORTHBOUND LANE **(NBL)**) REST AREA
FEBRUARY 2014
HAYWOOD COUNTY, NORTH CAROLINA

DIVISION 15B- COMPENSATION FOR MECHANICAL **(NBL)**

COMPENSATION

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

"Mechanical Installation for**(NBL)** Rest Area Building"……Lump Sum

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HIGHWAY US-23/74 (NORTHBOUND LANE **(NBL))** REST AREA
FEBRUARY 2014
HAYWOOD COUNTY, NORTH CAROLINA

DIVISION 16- COMPENSATION FOR ELECTRICAL **(NBL)**

COMPENSATION

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

"Electrical Installation for **(NBL)**Rest Area Building"…….Lump Sum

SECTION 01151 - CONSTRUCTION AND DEMOLITION MATERIALS RECYCLING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

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

1.02 DEFINITIONS

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

1.03 SUBMITTALS

A. Contractor's Construction Waste and Recycling Plan
   1. Review Contract Documents and estimate the types and quantities of materials under the Work that are anticipated to be feasible for on-site processing, source separation for re-use or recycling. Indicate the procedures that will be implemented in this program to effect jobsite source separation, such as, identifying a convenient location where dumpsters would be located, putting signage to identify materials to be placed in dumpsters, etc.

   2. Prior to commencing the Work, submit Contractor's Construction Waste and Recycling Plan. Submit in format provided (**Section 01151A**). The Plan must include, but is not limited to the following:
      a. Contractor's name and project identification information;
      b. Procedures to be used;
      c. Materials to be re-used and recycled;
      d. Estimated quantities of materials;
      e. Names and locations of re-use and recycling facilities/sites;
      f. Tonnage calculations that demonstrate that Contractor will re-use and recycle a minimum 50% by weight of the construction waste materials generated in the Work.
      g. Cost of local tip fees for non-recycled material/ton
      h. Cost or revenue generated from recycled material, per category, per ton (note: cost and revenue are to be managed by the General Contractor as part of the Work; tonnage, cost, and savings information are to be provided to the Architect for tracking purposes only)
   2. Contractor's Construction Waste and Recycling Plan must be approved by the Architect prior to the start of Work.
   3. Contractor's Construction Waste and Recycling Plan will not otherwise relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.

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

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

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

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

PART 2 PRODUCTS (not used)

PART 3 EXECUTION

3.01 SALVAGE, RE-USE, RECYCLING AND PROCEDURES

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

3.02 DISPOSAL OPERATIONS AND WASTE HAULING

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

D. Deliver to facilities that can legally accept new construction, excavation and demolition materials for purpose of re-use, recycling, composting, or disposal.
E. Do not burn, bury or otherwise dispose of solid waste on the project job-site.

3.03 REVENUE

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

END OF SECTION

SECTION 01200 - PROGRESS DOCUMENTATION AND PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Progress documentation requirements:
      a. Contractor's construction schedule.
   2. Progress procedures:
      a. Progress meetings.

B. Contract time is indicated elsewhere.

1.02 SUBMITTALS

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

1.03 FORM OF SUBMITTALS

A. Schedules - General:
   1. Provide legend of symbols and abbreviations for each schedule.
   2. Use the same terminology as that used in the contract documents.
   3. When transparencies are submitted, use only media which will not fade or lose contrast over time.

B. Bar Charts:
   1. Provide individual horizontal bars representing the duration of each major activity.
   2. Coordinate each element on the schedule with other construction activities.
   3. Show activities in proper sequence.
   4. Show percentage of completion of each activity.
   5. Include cost bar at top of chart, showing estimated and actual costs of work performed at the date of each application for payment.
   6. Use vertical lines to mark the time scale at not more than one week intervals.
   7. Prepare on reproducible transparency.
   8. Use sheets of sufficient number and width to show the full schedule clearly.

1.04 COORDINATION

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Prepare and submit a construction schedule.

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

c. All submittals required.
d. Completion of structure.
e. Completion of permanent enclosure.
f. Instruction of the owner's personnel in operation and maintenance of equipment and systems.
g. Substantial and final completion, with time frames for the Engineer's completion procedures.

5. In developing the schedule take into account:
   a. Work by owner.
   b. Need for temporary heating, ventilating, or air-conditioning.

C. The Engineer will notify the contractor if schedule is not satisfactory; revise and resubmit.
   1. Resubmit within 7 days.

D. Make and distribute copies of schedule to the Engineer, to subcontractors, and to other entities whose work will be influenced by schedule dates.
   1. Hang a copy of the schedule up in each field office or meeting room.

E. Update the schedule whenever changes occur or are made, or when new information is received, but not less often than at the same intervals at which applications for payment are made.
   1. Indicate changes made since last issue; show actual dates for activities completed.
   2. Submit updated schedule with application for payment.
   3. Issue updated schedule with report of meeting at which revisions are made.
   4. Issue updated schedule in same manner as original schedule.

3.02 PROGRESS MEETINGS

A. Schedule and conduct periodic progress meetings during construction period.
   1. Have meetings once a month.
   2. Notify the Engineer at least one week in advance of date of meeting; the Engineer.

B. The following are required to attend:
   1. Project superintendent.
   2. Major subcontractors and suppliers.
   3. Others who have an interest in the agenda.
   4. State inspectors.

C. Prepare and distribute agenda prior to meetings; cover the following topics when applicable:
   1. Review minutes of previous meeting.
   2. Status of submittals and impending submittals.
   3. Actual progress of activities in relation to the schedule.
   4. Actual and anticipated delays, their impact on the schedule, and corrective actions taken or proposed.
   5. Actual and potential problems.
   6. Status of change order work.
   7. Status of corrective work ordered by the Engineer.
   8. Progress expected to be made during the next period.

END OF SECTION 01200

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 DEFINITIONS

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

1.03 FORM OF SUBMITTALS

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

b. Electronic Submittal shall be in PDF. format.
c. Architect and Engineer shall review, stamp and sign submittal; scan and return 1 set to the General Contractor, Resident Engineer, and Roadside Engineer for distribution to his subcontractors, suppliers, and retain 1 copy for his field office.

C. If additional sets are needed by other entities involved in work represented by the samples, submit with original submittal.
D. Copies in excess of the number requested will not be returned.

1.04 COORDINATION OF SUBMITTALS

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 TIMING OF SUBMITTALS

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

3.02 SUBMITTAL PROCEDURES - GENERAL

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

   Provide blank space on the label or on the submittal itself for action marking; minimum 4 inches wide by 5 inches high.

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

3.03 SHOP DRAWINGS

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

3.04 PRODUCT DATA

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

3.05 SAMPLES

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

3.06 REVIEW OF SUBMITTALS

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

3.07 RETURN, RESUBMITTAL, AND DISTRIBUTION

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

END OF SECTION 01300

SECTION 02072 - DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Demolition and removal of portions of the existing Rest Area building or structure; including floor framing, exterior and interior siding/sheathing/drywall/tile walls, windows, doors and frames, drywall ceilings, wall & roof fiberglass insulation, roofing, toilet partition/accessories, display cases, solar panels & systems, plumbing, mechanical heating and cooling equipment, electrical systems.
      a. Site Clearing including sidewalks, shrub and root removal are by the Contractor; (see Landscape Spec's).
      b. See Section 01151 for the Construction and Demolition Materials Recycling Requirements.
   2. Owner shall have the right to salvage the Contractor removed automatic sliding doors, display cases, toilet fixtures, and toilet partitions.
      a. Removal of existing small shrubbery (may be by NCDOT, Division 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. The owner does not warrant that the condition of structures will not have changed since the time of inspection for bidding purposes.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

2. Perform demolition so as to prevent damage to adjacent improvements and facilities to remain.

B. Construct and maintain shoring, bracing, and supports as necessary to ensure the stability of structures.

3.03 UTILITY SERVICES

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

3.04 POLLUTION CONTROLS

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

3.05 DEMOLITION - GENERAL

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

3.06 DEMOLITION ON OR BELOW GRADE

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

3.07 FILLING BELOW-GRADE AREAS AND VOIDS

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

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3.08 DISPOSAL OF DEMOLISHED MATERIALS

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

3.09 CLEANING

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

END OF SECTION 02072

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.
   1. Building slabs: Capillary water barrier material.

3.09 BUILDING SLAB AREAS

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

3.10 COMPACTION

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

3.11 GRADING

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

3.12 FIELD QUALITY CONTROL

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

3.13 MAINTENANCE

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

3.14 DISPOSAL OF EXCESS AND WASTE MATERIALS

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

END OF SECTION 02200

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SECTION 02280 - SOIL TREATMENT

PART 1 GENERAL

1.01 SUMMARY

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

1.02 SUBMITTALS

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

1.03 QUALITY ASSURANCE

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

1.04 WARRANTY

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

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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

02820 - CHAIN LINK FENCE

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Galvanized (zinc) coated chain link fabric with galvanized steel framework and accessories for commercial or industrial applications.

1.02 REFERENCES

A. ASTM A392 Standard Specification for Zinc-Coated Steel Chain-Link Fabric
B. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-dip Galvanized Coatings
C. ASTM B221 Standard Specification for Aluminum and Aluminum Alloy Bars, Rods, Wire Profiles and Tubes
D. ASTM F552 Standard Terminology Relating to Chain Link Fencing
E. ASTM F567 Standard Practice for Installation of Chain Link Fence
F. ASTM F626 Standard Specification for Fence Fittings
G. ASTM F900 Standard Specification for Industrial and Commercial Swing Gates
H. ASTM F1043 Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework
I. ASTM F1083 Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
J. WLG2445 Chain Link Fence Manufacturers Institute, Chain Link Fence Wind Load Guide for the Selection of Line Posts and Line Post Spacing

1.03 SUBMITTALS

A. Changes in specifications may not be made after the bid date.
B. Shop drawings: Layout of fences and gates with dimensions, details, and finishes of components, accessories, and post foundations.
C. Product data: Manufacturer's catalog cuts indicating material compliance and specified options.
D. Samples: If requested, samples of materials (e.g., fabric, wires, and accessories).

1.04 QUALITY ASSURANCE

A. Manufacturer: Company having manufacturing facilities in the United States with a minimum 5 years experience specializing in manufacturing of chain link fence products.
B. Fence contractor: Contractor having 5 years experience installing similar projects in accordance with ASTM F567.
C. Tolerances: ASTM current specification and tolerances apply and supersede any conflicting tolerance.
D. Substitutions: Alternate chain link products may be acceptable by the architect as equal if approved in writing ten days prior to bidding provided that the items submitted meet the specifications contained in this document.
E. Single source: To ensure system integrity obtain the chain link system, framework, fabric, fittings, gates and accessories from a single source.

PART 2 - PRODUCTS

2.01 CHAIN LINK FENCE FABRIC

A. Galvanized (zinc) coated steel chain link fabric per ASTM A392
Size and Height: Chain link fabric 2 in. mesh, 9 gauge wire

2.02 FITTINGS

A. Post caps: ASTM F626 galvanized pressed steel, malleable iron, or aluminum alloy weather tight closure cap for tubular posts. Provide one cap for each post.
B. Carriage bolts and nuts: Galvanized of commercial quality

2.03 CHAIN LINK SWING GATE

A. Swing gates double leaf per site plan. Fabricate chain link swing gates in accordance with ASTM F900. Gate frame to be of welded construction. Weld areas to be protected with zinc-rich paint per ASTM A780. The gate frame members are to be spaced no greater than 8' 0" (2.44 m) apart horizontally or vertically. Exterior members to be 1.900" (48.3 mm) OD pipe, interior members when required shall be 1.660" (42.2 mm) OD pipe. Pipe to be Grade 1 ASTM F1083 per section 2.03. Chain link fabric to match specification of fence system. Fabric to be stretched tightly and secured to vertical outer frame members using tension bar and tension bands spaced 12" (304.8 mm) on center and tied to the horizontal and interior members 12" (304.8 mm) on center using 9 gauge galvanized steel ties per section 2.04.
B. Hinges, hot dip galvanized pressed steel or malleable iron, structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180° (3.14 rad)
C. Latch: Galvanized forked type capable of retaining gate in closed position and have provision for padlock. Latch shall permit operation from either side of gate.
D. Double gates: Provide galvanized drop rod with center gate stop pipe or receiver to secure inactive leaf in the closed position. Provide galvanized pressed steel locking latch, requiring one padlock for locking both gate leaves, accessible from either side.
E. Gate holdback: Provide galvanized gate hold back keeper for each gate leaf over 5' (1524 mm) wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.
F. Gate posts: Grade 1 pipe ASTM F1083, select gate post from table below

Gate fabric height over 6 ft. to 12 ft. (1.2 to 2.4m)

Gate leaf width		
up to 6 ft.	(1.8 m)	2.875 in. (73.0 mm)
over 6 ft. to 12 ft.	(1.8 to 3.7 m)	4.000 in. (101.6 mm)
over 12 ft. to 18 ft.	(2.4 to 5.5 m)	6.625 in. (168.3 mm)
over 18 ft. to 24 ft.	(5.5 to 7.3 m)	8.625 in. (219.1 mm)

2.04 POST SETTING MATERIALS

A. Concrete: Minimum 28 day compressive strength of 3,000 psi (20 MPa).

2.05 ACCESSORIES

A. Privacy Slats: Slats to be manufactured from a combination of color pigments, quality high density virgin polyethylene and ultraviolet inhibitors, having a 25 year limited warranty against either color fading or breakage of slats and locking-channel used under normal climactic extremes experienced In North America and Hawaii. Color: to be determined

PART 3 EXECUTION

3.01 SITE EXAMINATION

A. Ensure property lines and legal boundaries of work are clearly established.
B. Survey of fence location to be provided by general contractor
C. Verify areas to receive fencing are completed to final grade.

3.02 CHAIN LINK FRAMEWORK INSTALLATION

A. Install chain link fence system in accordance with ASTM F567 and manufacturer's instructions.
B. Concrete set posts: Excavate holes in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than outside dimension of post, and depths approximately 6" (152 mm) deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36" (914 mm) below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post and slope to direct water away from posts.
C. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.
D. Bracing: Install horizontal brace and truss assembly at mid-height or above for fences 6' (1829 mm) and over at each fabric connection to the terminal post. The diagonal truss rod is installed at the point where the brace rail is attached to the terminal post and diagonally down to the bottom of the adjacent line post. Place the truss rod in tension by adjusting the turnbuckle.
E. Tension wire: Install tension wires so that it will be located 4" (101.6 m) up from bottom the fabric. If top rail is not specified, install the tension wire so that it will be located 4" (101.6 mm) down from the top of the fabric. Stretch and install tension wire before installing the chain link fabric and attach it to each post using wire ties.

3.03 CHAIN LINK GATE INSTALLATION

A. Swing gates: Installation of swing gates and gate posts shall be per ASTM F567. Direction of swing shall be as shown on drawings. Gates shall be hung plumb in the closed position with minimal space from grade to bottom of gate leaf. Double gate drop bar receiver shall be set in a minimum concrete footing 6" (152 mm) diameter by 24" (610 mm) deep. Gate leaf holdbacks shall be installed on all double gates and all gate leafs greater than 5' (1524 mm) in width.

3.04 ACCESSORIES

A. Privacy slats: Install and lock in privacy slats in the fabric in accordance with manufacturer's instructions.

3.05 ELECTRICAL GROUNDING

A. Grounding when required shall be the responsibility of a licensed electrical contractor.

3.06 SITE CLEAN UP

A. Clean up area adjacent to fence line from debris and unused material created by fence installation.

END OF SECTION

SECTION 03300 – CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 SUBMITTALS

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

1.03 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

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

2.02 MISCELLANEOUS MATERIALS AND ACCESSORIES

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

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

B. Reinforcing Materials:
   1. Reinforcing Bars: Provide deformed bars complying with the following, except where otherwise
      indicated: ASTM A 615, Grade 60.
   2. Welded Wire Fabric: ASTM A 185, cold-drawn steel, plain.
   3. Tie wire: Black annealed type, 16-1/2 gage or heavier.
   4. Supports: Bar supports conforming to specifications of CRSI "Manual of Standard Practice."

C. Vapor Retarder: Membrane for installation beneath slabs on grade, resistant to decay when tested in accordance with ASTM E 1745, and as follows:
   1. 15 mils thick, multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs Single ply polyethylene sheet is prohibited.

D. Moisture-Retaining Cover: ASTM C 171, and as follows:
   1. Polyethylene film.

E. Liquid Curing Compounds: Comply with ASTM C 309, Type 1 and compatible with flooring.

2.03 CONCRETE MIX DESIGN

A. Proportioning of Normal Weight Concrete: Comply with recommendations of ACI 211.1.

B. Specified Compressive Strength f'c at 28 Days for Locations as Indicated on Drawings:
   1. Footings, walks: 3000 psi., maximum w/c ratio = 0.58
   2. Interior Slabs: 4000 psi, maximum w/c ratio = 0.50.
   3. Exterior slabs: 4500 psi, maximum w/c ratio = 0.45.

C. Admixtures:
   1. Air-entraining admixture: Use in mixes for exterior exposed concrete unless otherwise specifically indicated. Add at rate to achieve total air content in accordance with Table 1.4.3 of ACI 201.2. For concrete not exposed to exterior, add at rate to achieve total air content between 1 percent and 3 percent.
      a. Do not use in slabs-on-grade scheduled to receive topping, unless manufacturer of topping recommends use over air-entrained concrete.
   2. Water-reducing admixture: Add as required for placement and workability.
   3. Do not use admixtures not specified or approved.

PART 3 - EXECUTION

3.01 VAPOR RETARDER INSTALLATION

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

3.02 JOINT CONSTRUCTION

A. Construction Joints: Locate and install construction joints as indicated on drawings. If construction joints are not indicated, locate in manner which will not impair strength and will have least impact on appearance, as acceptable to the Engineer.
   1. Keyways: Provide keyways not less than 1-1/2 inches deep.
   2. Reinforcement: Continue reinforcement across and perpendicular to construction joints, unless details specifically indicate otherwise.

B. Control Joints: Construct contraction joints in slabs poured on grade to form panels of sizes indicated on drawings, but not more than 18 feet apart in either direction.
   1. Saw cuts: Form control joints by means of saw cuts one-fourth slab depth.

3.03 CONCRETE PLACEMENT

A. Inspection: Before beginning concrete placement, inspect formwork, reinforcing steel, and items to be embedded, verifying that all such work has been completed.
   1. Wood forms: Moisten immediately before placing concrete in locations where form coatings are not used.

B. Placement - General: Comply with requirements of ACI 304 and as follows:
   1. Schedule continuous placement of concrete to prevent the formation of cold joints.
   2. Provide construction joints if concrete for a particular element or component cannot be placed in a continuous operation.
   3. Deposit concrete as close as possible to its final location, to avoid segregation.

C. Placement in Forms: Limit horizontal layers to depths which can be properly consolidated, but in
   no event greater than 24 inches.
   1. Vibrate concrete sufficiently to achieve consistent consolidation without segregation of coarse aggregates.
   2. Do not use vibrators to move concrete laterally.

D. Slab Placement: Schedule continuous placement and consolidation of concrete within planned construction joints.
   1. Thoroughly consolidate concrete without displacing reinforcement or embedded items, using internal vibrators, vibrating screeds, roller pipe screeds, or other means acceptable to Engineer.
   2. Strike off and level concrete slab surfaces, using highway straightedges, darbies, or bull floats before bleed water can collect on surface. Do not work concrete further until finishing operations are commenced.

3.04 FINISHING FORMED SURFACES

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

3.05 FINISHING SLABS

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

concrete surface by final troweling operation. Completed surface shall be free of trowel marks, uniform in texture and appearance, and within surface tolerance specified.
   a. Grind smooth surface defects which would telegraph through final floor covering system.

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

3.06 CONCRETE CURING AND PROTECTION

A. General:
   1. Prevent premature drying of freshly placed concrete, and protect from excessively cold or hot temperatures until concrete has cured.

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

3.07 QUALITY CONTROL TESTING DURING CONSTRUCTION

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

END OF SECTION 03310

SECTION 04220 – CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

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

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS

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

2.02 MORTAR AND GROUT MATERIALS

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

2.03 REINFORCEMENT AND ANCHORAGE

A. Joint Reinforcement and Anchorage Materials: Comply with the following general requirements for materials required in joint reinforcement and anchorage devices:
   1. Steel wire: ASTM A 82.
      a. Hot-dip galvanizing (after fabrication): ASTM A 153, Class B-2.
         1. Use: Exterior locations or in contact with earth.
   2. Hot-dip galvanized steel sheet: ASTM A 635 or ASTM A 366; galvanizing in compliance with ASTM A 153, Class B.
      a. Use: Anchors and miscellaneous sheet metal in masonry accessories at exterior exposures.
B. Joint Reinforcement: Welded-wire units prefabricated into straight lengths of not less than 10 feet, with deformed continuous side rods and plain cross rods.
   1. Width: Approximately two inches less than nominal wall width, providing not less than 5/8 inch mortar coverage on exterior exposures and ½ inch elsewhere.
   2. Wire sizes:
      a. Side rod diameter: 0.1483 inch.
      b. Cross rod diameter: 0.1483 inch.
   3. Configuration:

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

2.04 MISCELLANEOUS MASONRY ACCESSORIES

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

2.05 MORTAR AND GROUT MIXES

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

PART 3 - EXECUTION

3.01 INSTALLATION PROCEDURES

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

3.02 LAYING MASONRY UNITS

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

3.03 JOINT REINFORCEMENT, SINGLE-WYTHE WALLS

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

3.04 CLEANING AND PROTECTION

A. Clean masonry after mortar is thoroughly set and cured.
   1. Scrape off adhered mortar particles by hand, using non-metallic tools.
   2. Comply with directions of concrete unit masonry manufacturer and NCMA Tek Bulletin No. 45 for cleaning CMU.

B. Protection: Institute protective measures as required to ensure that unit masonry work will be clean and undamaged at substantial completion.

END OF SECTION 04220

SECTION 04475 – FLAGSTONE PAVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flagstone pavers for exterior use.

1.02 REFERENCES

A. American National Standards Institute (ANSI): ANSI A118.5 Specifications for Latex-Portland Cement Mortar.
B. Tile Council of America (TCA): Handbook for Ceramic Tile Installation

1.03 SUBMITTALS

A. Submit under provisions of Section 01300.
B. Product Data:
   1. Preparation instructions.
   2. Storage and handling requirements.
   3. Installation methods.
C. Selection Samples: Standard sample board consisting of small-scale pieces of veneer units showing full range of textures and colors.
D. Verification Samples: Following initial sample selection submit "laid-up" sample board using the selected stone and mortar materials and showing the full range of colors expected in the finished Work; minimum sample size: 3 feet by 3 feet (1 m by 1 m).
E. Quality Assurance/Control Submittals:
   1. Qualifications:
      a. Proof of manufacturer qualifications.
      b. Proof of installer qualifications.
   2. Regulatory Requirements: Evaluation reports.
   3. Installation instructions for related materials.
F. Closeout Submittals: Reference Section 01780 - Closeout Submittals; submit following items:
   1. Maintenance Instructions.
   2. Special Warranties.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Experienced mason familiar with installation procedures.
B. Mock-Up: Provide a mock-up for evaluation of final appearance.
   1. Prepare 4 foot by 4 foot (1220 mm by 1220 mm) sample at a location on the structure as selected by the Architect. Use approved selection sample materials and colors.
   2. Obtain Architect's approval.
   3. Protect and retain sample as a basis for approval of completed manufactured stone work. Approved sample may be incorporated into completed work.
   4. Do not proceed with remaining work until workmanship, color, and texture are approved by Architect.
   5. Refinish mock-up area as required to produce acceptable work.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.06 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.01 MATERIALS

A. Palletized patio flagstone pavers
   1. Conforms to ASTM C 616-85.
   2. Slip resistance: coefficient of friction greater than 0.6 wet
   3. Surface-no cliffs greater than 1/16"

2.03 RELATED MATERIALS

A. Mortar:
   1. Cement: Cement complying with ≈STM C 270.
   2. Lime: ≈STM C 207.
   3. Sand: ASTM C 144, natural or manufactured sand.
   4. Color Pigment: ASTM C 979, mineral oxide pigments.
   5. Water: Potable.
   6. Pre-Packaged Latex-Portland Cement Mortar: ANSI A118.4.

B. Sealer: (if required)
   1. Water based silane or siloxane masonry sealer, clear.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. Examine substrates upon which work will be installed.
C. Commencement of work by installer is acceptance of substrate.
D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Protection: Protect adjacent work from contact with mortar.
B. Clean surfaces thoroughly prior to installation.
C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Pavers to be installed within the flatness tolerances set forth in ANSI sections A108.01 and A108.02
C. Install and clean stone in accordance with manufacturer's instructions.

D. Apply sealer in accordance with sealer manufacturer's installation instructions.

3.4 PROTECTION

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

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Manufacturer's Field Service Representative shall make periodic site visits for installation consultation and inspection as requested by Owner.

3.6 CLEANING

A. Reference Section 01740 - Cleaning and Waste Management.
B. Remove protective coverings from adjacent work.
C. Cleaning Veneer Units:
   1. Wash with soft bristle brush and water/granulated detergent solution.
   2. Rinse immediately with clean water.
D. Removing Efflorescence:
   1. Allow veneer to dry thoroughly.
   2. Scrub with soft bristle brush and clean water.
   3. Rinse immediately with clean water; allow to dry.
   4. If efflorescence is still visible, repeat above procedure using a solution of 1 part household vinegar and 5 parts water.
   5. Rinse immediately with clean water.

END OF SECTION 04700

SECTION 04700 - ARCHITECTURAL STONE VENEER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Architectural simulated stone veneer and trim.

1.02 REFERENCES

A. American National Standards Institute (ANSI): ANSI A118.4 Specifications for Latex-Portland Cement Mortar.

B. American Society for Testing and Materials (ASTM):
1. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2. ASTM C 67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
3. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar.
4. ASTM C 177 - Standard Test Method for Steady-State Head Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
5. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes.
6. ASTM C 270 - Standard Specification for Mortar for Unit Masonry.
7. ASTM C 482 - Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement.
8. ASTM C 567 - Standard Test Method for Determining Density of Structural Lightweight Concrete.
9. ASTM C 847 - Standard Specification for Metal Lath.
10. ASTM C 932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering.
11. ASTM C 979 - Standard Specification for Pigments for Integrally Colored Concrete.
12. ASTM C 1032 - Standard Specification for Woven Wire Plaster Base.
13. ASTM C 1059 - Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete.
14. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

C. City of Los Angeles: Research Report (LARR).

D. International Code Council (ICC):
1. ICC Evaluation Service - Evaluation Report AC51- Acceptance Criteria for Precast Stone Veneers.
2. ICC Evaluation Service - Evaluation Report ESR-1215 - Eldorado Stone, Eldorado Brick and Eldorado Adobe Veneers and Eldorado Accents.

E. Underwriter's Laboratory (UL): Building Materials Directory.

F. Uniform Building Code (UBC):
1. UBC Standard No. 14-1, Kraft Waterproof Building Paper.
2. UBC Standard 15-5 - Roof Tile.

G. US Department of Housing and Urban Development (HUD): Material Release Numbers.

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1.03 SUBMITTALS

A. Submit under provisions of Section 01300.
B. Product Data: Masonry Veneer Manufacturers Association (MVMA) see masonryveneer.org:
   1. Preparation instructions.
   2. Storage and handling requirements.
   3. Installation methods.
C. Selection Samples: Standard sample board consisting of small-scale pieces of veneer units showing full range of textures and colors.
D. Verification Samples: Following initial sample selection submit "laid-up" sample board using the selected stone and mortar materials and showing the full range of colors expected in the finished Work; minimum sample size: 3 feet by 3 feet (1 m by 1 m).
E. Quality Assurance/Control Submittals:
   1. Qualifications:
      a. Proof of manufacturer qualifications.
      b. Proof of installer qualifications.
   2. Regulatory Requirements: Evaluation reports.
   3. Installation instructions for related materials.
F. Closeout Submittals: Reference Section 01780 - Closeout Submittals; submit following items:
   1. Maintenance Instructions.
   2. Special Warranties.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Experienced mason familiar with installation procedures for manufactured veneer.
B. Product Certifications:
   1. ICC Evaluation Service - Evaluation Report ESR-1215.
   2. LARR - Research Report RR25589.
   3. HUD - Material Release Number 910.
   4. UL - Classification listing in Building Materials Directory: UL 546T (F8002).
C. Mock-Up: Provide a mock-up for evaluation of final appearance.
   1. Prepare 4 foot by 4 foot (1220 mm by 1220 mm) sample at a location on the structure as selected by the Architect. Use approved selection sample materials and colors.
   2. Obtain Architect's approval.
   3. Protect and retain sample as a basis for approval of completed manufactured stone work. Approved sample may be incorporated into completed work.
   4. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   5. Refinish mock-up area as required to produce acceptable work.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.
B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 PROJECT CONDITIONS

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

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1.07 WARRANTY

A. Manufacturer warrants veneers for a period of fifty years against manufacturing defects when used on structures conforming to local building codes and when installed in accordance with written instructions.
   1. Warranty coverage specifically excludes damage resulting from wall movement, settlement of the building, contact with chemicals or paint, discoloration due to contaminates, staining or oxidation.
   2. Warranty coverage is limited to replacement or repair of defective materials only and does not cover labor to remove or replace materials. Warranty coverage is limited to the original purchaser.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. **El Dorado (Woodlands Bluffstone),** Canyon Stone, Coronado
B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.02 STONE VENEER:

A. Veneer Unit Properties: Precast stone veneer units and accent pieces consisting of Portland cement, lightweight aggregates, and mineral oxide pigments.
   1. Compressive Strength: ASTM C 192 and ASTM C 39, 5 sample average: greater than 1,800 psi (12.4MPa).
   2. Shear Bond: ≈STM C 482: 50 psi (345kPa).
   3. Water Absorption: ICC Evaluation Service AC 51 (Section 4.6 and Table 2): Less than 22 percent when density is less than 85 PCF; less than 18 percent when density is less than 105 PCF.
   4. Freeze-Thaw Test: ≈STM C 67: Less than 3 percent weight loss and no disintegration.
   5. Thermal Resistance: ≈STM C 177: 0.473 at 1.387 inches (35 mm) thick.
B. Units:
   1. To be selected by owner
   2. Accessory units
      a. Wainscot sill block
      b. Column cap

2.03 RELATED MATERIALS

A. Weather Resistive Barrier: ≈STM D 226, Type 1, No. 15, non-perforated asphalt-saturated felt paper.
B. Reinforcing: Complying with code agency requirements for the type of substrate over which stone veneer is installed.
   1. ≈STM C 847, 2.5lb/yd2 (1.4kg/m2) galvanized expanded metal lath.
C. Mortar:
   1. Cement: Cement complying with ≈STM C 270.
   2. Lime: ≈STM C 207.
   3. Sand: ASTM C 144, natural or manufactured sand.
   4. Color Pigment: ASTM C 979, mineral oxide pigments.
   5. Water: Potable.
   6. Pre-Packaged Latex-Portland Cement Mortar: ANSI A118.4.
E. Sealer:
   1. Water based silane or siloxane masonry sealer, clear.

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2.4 MORTAR

A. Jointless/Dry-Stacked Installation:
   1. Mix mortar in accordance with Manufacturer Suggested Mix mortar preparation instructions.
   2. Add color pigment in accordance with pigment manufacturer's instructions.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.
B. Examine substrates upon which work will be installed.
C. Commencement of work by installer is acceptance of substrate.
D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Protection: Protect adjacent work from contact with mortar.
B. Clean surfaces thoroughly prior to installation.
C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Install and clean stone in accordance with Jointless/Dry-Stacked.
C. Apply sealer in accordance with sealer manufacturer's installation instructions.

3.4 PROTECTION

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

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Manufacturer's Field Service Representative shall make periodic site visits for installation consultation and inspection as requested by Owner.

3.6 CLEANING

A. Reference Section 01740 - Cleaning and Waste Management.
B. Remove protective coverings from adjacent work.
C. Cleaning Veneer Units:
   1. Wash with soft bristle brush and water/granulated detergent solution.
   2. Rinse immediately with clean water.
D. Removing Efflorescence:
   1. Allow veneer to dry thoroughly.
   2. Scrub with soft bristle brush and clean water.
   3. Rinse immediately with clean water; allow to dry.
   4. If efflorescence is still visible, repeat above procedure using a solution of 1 part household vinegar and 5 parts water.

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5. Rinse immediately with clean water.

END OF SECTION 04700

SECTION 04852 - THINSTONE VENEER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Thin cut veneer masonry construction of natural stone set in polymer modified cement mortar over a structural wall backing of:
   1. Cement board over framed wall and exterior grade sheathing.

B. Special decorative sawn thin veneer stone shapes for trim.

1.02 REFERENCES

A. ANSI A108 - Specification for the Installation of Ceramic Tile.
B. ANSI A108.01 - General Requirements: Subsurfaces and Preparations by Other Trades.
C. ANSI A108.02 - General Requirements: Materials, Environmental, and Workmanship.
D. ANSI A118.4 - American National Standard for Latex-Portland Cement Mortar.
E. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units.
F. ANSI A118.10 - Installation of Grout in Tilework.
G. ASTM A 653 - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.
H. ASTM C 91 - Standard Test Method for Masonry Cement.
I. ASTM C 270 - Mortar for Unit Masonry.
J. ASTM C 780 - Preconstruction Evaluation of Mortar for Plain & Reinforced Masonry.
K. ASTM C 847 - Standard Test Method for Metal Lath.
L. ASTM C 1325 - Standard Test Method for Non Asbestos Fiber Mat Reinforced Cementitious Backer Units.
M. ASTM D 226 - Standard Specification for Asphalt Saturated Organic Felt Used in Roofing and Waterproofing.
N. ACI 530.1/ASCE 6/TMS 602 - Specification for Masonry Structures; Cold and hot weather requirements for mortar and grout.
O. National Green Building Standard (NGBS)
P. The Brick Industry Association (BIA) - Technical Notes - 18A: Accommodating Expansion of Brickwork.
Q. Tile Council of North America, Inc. (TCNA) - Installation Method W201E
R. Tile Council of North America, Inc. (TCNA) - Installation Method W202E
S. Tile Council of North America, Inc. (TCNA) - Installation Method W244E

1.03 DESIGN / PERFORMANCE REQUIREMENTS

A. Design Requirements: Perform Work in accordance with ACI 530/ASCE 5/TMS 402 Building Code Requirements for Masonry Structures, ACI 530.1/ASCE 6/TMS 602 Specifications for Masonry Structures and the applicable Building Code.
B. Design foundations, supporting walls, anchorage, spans, fastening, and joints under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.
C. Design, fabricate, and install thinstone work to withstand normal loads from wind, gravity, movement of building structure, and thermally induced movement, as well as to resist deterioration under conditions of normal use including exposure to weather, without failure.
D. Design to include provisions to prevent galvanic and other forms of corrosion by

insulating metals and other materials from direct contact with non-compatible materials, or by suitable coating.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.
B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Cleaning methods.
C. Design Data: Submit mortar design mix when Property specification of ASTM C 270 is to be used, with required environmental conditions, and admixture limitations.
D. Selection Samples: For each stone product specified, two complete sets of color samples, minimum size 48 inches (1216 mm) square, representing actual product, color, and texture.
E. Samples: Submit samples of mortar representing actual mortar color and color range.
F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
G. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic checking and adjustment of cable tension and periodic cleaning and maintenance of all railing and infill components.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
B. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience.
C. Mock-Up: Construct sample panel at location indicated or directed, and as follows:
   1. Recommended Size: 8 feet by 8 feet (2.4 m by 2.4 m) or a size that satisfies the Architect. Size should be no less than 4 feet by 4 feet (1.2 m by 1.2 M).
   2. Include all stone unit types and sizes to be used including a typical corner condition, special shapes and mortar joint treatment. Clean the sample panel using the same materials and tools as planned for the final stone masonry construction.
   3. Obtain Architect's acceptance of sample panel before beginning construction activities of this section.
   4. Do not remove sample panel until construction activities of this section have been accepted by the Architect.
   5. Remove sample panel at the completion of the work.
   6. Sample panel may be incorporated into the work.
D. Pre-installation Conference:
   1. Hold a pre-installation conference, prior to start of stone veneer installation. Attendees shall include Contractor, Architect, installer, Owner's Representative, and manufacturer's designated representative.
   2. Review related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of thin stone veneer and components, installer's qualifications, equipment, and coordinate methods, procedures and sequencing requirements for installation and protection.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products on pallets, under cover and in manufacturer's unopened packaging until ready for installation.
B. Store stone materials on pallets on a dry level surface. Pallets shall not be stacked

and shall be covered with tarps.

C. Store mortar under cover and in an area where temperature is maintained between 4 degrees C (40 degrees F) to 43 degrees C (110 degrees F).

1.07 PROJECT CONDITIONS

A. Hot and Cold Weather Requirements: In accordance with ACI 530.1/ASCE 6/TMS 602 Specifications for Masonry Structures.

B. Ambient temperature shall be 40 degrees F (4.4 degrees C) or above during erection of stone masonry. When ambient temperature falls below 50 degrees F, mortar mixing water shall be heated.

1.08 WARRANTY

A. Provide mortar manufacturer's standard materials and labor warranty of installation systems over exterior and interior concrete and masonry wall substrates, including setting mortar, pointing mortar and waterproof membrane, for a period of 25 years.

B. Provide mortar manufacturer's standard materials and labor warranty of installation systems over exterior and interior sheathed wood and steel framed walls, including setting mortar, pointing mortar and waterproof membrane, for a period of 15 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Cabot
   2. PetraSlate
   3. Norstone

B. Substitutions: Submit to Architect and Owner

2.02 THINSTONE VENEER

A. Pattern: Ledgestone panels

B. Thickness: 3/4 to 1-1/2 inches (19 mm to 38 mm).

C. Pre-cut corners.

2.03 SPECIAL SHAPES

A. Provide special sawn veneer shapes as indicated on the Drawings and as follows:
   1. Cornerstones.

2.04 ACCESSORIES

A. Cement Board: Cementitious panels with glass mesh reinforcement, both faces, exterior grade meeting the requirements of ASTM C 1325 or ANSI A118.9.

B. Sealant: Provide as specified in Section 07900 - Joint Sealers.

C. Sealer: Water based masonry sealer, clear

2.05 MORTAR

A. Mortar Bed: Polymer modified Portland cement with graded aggregates; factory prepared per ANSI A118.4.

B. Pointing Mortar:

C. Mortar additive: Liquid used in place of water that inhibits staining caused by bacteria, mold and mildew. "Mortar Enhancer" as manufactured by Laticrete International, Inc.
D. Water: Clean and potable.

2.06 MORTAR MIXES

A. Mortar Mixes:
   1. Mortar for Structural Masonry: Complying with ASTM C 270 and with polymer mortar manufacturers' written instructions.
B. Mortar Mixing:
   1. Mix mortar ingredients in accordance with ASTM C 270. Mix only in quantities needed for immediate use.
   2. Do not use anti-freeze compounds to lower freezing point of mortar.
   3. Mortar Bed: Mix fortified mortar and water to a creamy consistency, per manufacturer's instructions.
   4. Thin Bed Mortar: Mix thin bed mortar and water to a creamy consistency, per manufacturer's instructions.
   5. Pointing Mortar: Mix pointing mortar with mortar additive per manufacturer's instructions

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until backing structure is plumb, bearing surfaces are level and substrates are clean and properly prepared.
B. Verify that built-in items are in proper location, and ready for roughing into stone masonry.
C. Verify that substrate tolerances as within a maximum of 1/16 inch in 1 foot, with a maximum of 1/32 between adjoining edges.
D. Verify that weather barrier installation is complete and ready for the work of this Section.
E. Notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 STONE PREPARATION

A. Stone must be water saturated, surface-dry when placed. Water down the stone 24 hours prior to placement until saturated. Reapply water to keep stone saturated as required by weather conditions.
B. Coordinate placement of flashings and other moisture control products supplied by other sections.
C. Clean all built-in items of loose rust, ice, mud, or other foreign matter before incorporating into the wall. All ferrous metal built into the wall shall be primed or galvanized.

3.04 INSTALLATION – GENERAL

A. Install stone veneer in accordance with ANSI A108 and as indicated below.

B. Install lathing and mortar bed in accordance with ANSI A108.01 and as indicated below.
C. Use manufacturer's standard stone veneer corner units at all outside corners.
D. Do not install chipped or cracked stone veneer.
E. Expansion Joints:
   1. Layout expansion joints prior to beginning installation of stone masonry veneer.
   2. Place expansion joints where indicated on Drawings and in accordance with BIA Technical Note 18A, TCNA EJ171 and NCMA TEK 10-2B.
   3. Saw-cut stones to maintain continuous and straight horizontal and vertical expansion joints.
   4. Fill expansion joints with sealant as recommended by sealant manufacturer.
F. Flashing:
   1. Clean surface of masonry smooth and remove any projections, which could damage flashings.
   2. Place flashing on a bed of mortar.
   3. Cover flashing with mortar.
   4. Provide weep vents at head joints placed every 16 inches (406 mm) along the first course immediately above flashing or as recommended by weep vent manufacturer.
G. Control and Expansion Joints: Keep joints open and free of debris. Coordinate control joint in accordance with Section 07900 for sealant performance.
H. Sealant Recesses: Provide open joint 3/4 inch (19 mm) deep and 1/4 inch (6 mm) wide, where masonry meets doors, windows and other exterior openings. Coordinate sealant joints in accordance with Section 07900 for sealant performance.
I. Cutting And Fitting: Cut and fit for chases, pipes, conduit, sleeves, grounds, and other penetrations and adjacent materials. Coordinate with other sections of work to provide correct size, shape, and location.

3.05 INSTALLATION - CEMENT BOARD METHOD

A. Cement Board over framed interior wall:
   1. Install stone veneer in accordance with TCNA Installation Method W244C.
   2. Install cement board per cement board manufacturer's printed instructions and in accordance with ANSI A118.9. Tape all board joints and embed tape in thin bed mortar.
   3. Apply thin bed mortar with appropriate notched trowel to thickness recommended by mortar manufacturer. Apply only as much mortar as can be covered with stone veneer while mortar is wet and tacky.
   4. Back-butter stone masonry veneer.
   5. Set stone veneer to ensure full bedding and flatness.
   6. Remove excess mortar. Do not allow mortar to dry on face of stone veneer.
   7. Allow stone veneer to set until firm. Minimum 24 hours at 70 degrees

3.06 POINTING STONE VENEER

A. Verify that joints to be grouted are free of dirt, debris, and wedges or spacers.
B. Surface temperature must be between 40 and 90 degrees F prior to grouting.
C. Dampen surfaces prior to grouting.
D. Grout joints as soon as possible after initial set of setting bed and in compliance with ANSI A108.10.
E. Apply grout using pointing bag, force grout into joints taking care not to get grout on adjacent stone surfaces. Strike joints clean after initial set using striking or joint tool.
F. Remove excess grout using masonry brush or sponge, do not over wash grout joint.
G. Grout joints at sheet metal flashing by applying Flashing Mortar to seal joint between stone veneer and sheet metal flashing. Apply Flashing Mortar in accordance with manufacturer's instructions.

H. Cure grout by maintaining in a damp condition for seven days unless otherwise recommended by grout manufacturer.

3.07 FIELD QUALITY CONTROL

A. Test mortar and grout in accordance with Section 01110.
B. Testing of Mortar Mix: In accordance with ASTM C 780.

3.08 PROTECTION

A. Protect completed work minimum 72 hours or until mortar bed and grout have fully cured. Protect installed products until completion of project.
B. Cover the top of unfinished stone masonry work to protect it from the weather.
C. Extend cover a minimum of 24 inches down both sides and hold securely in place.
D. Prevent staining of stone from mortar, grout, sealants, and other sources. Immediately remove such materials from stone without damage to the stonework.
E. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
F. Protect sills, ledges and projections from droppings of mortar and sealants.
G. Touch-up, repair or replace damaged products before Substantial Completion.

3.09 CLEANING

A. Keep the face of stone free of mortar as the work progresses. If residual mortar is on the face of the stone, allow to dry partially and brush the mortar off the surface and sponge off the residue.
B. When the work is completed and the mortar has set for 2 to 3 days the surface may be cleaned from top to bottom using a mild masonry detergent acceptable to the stone manufacturer. Do not use metal brushes or acids for cleaning.

END OF SECTION

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—ANSI/AISC 360-05, 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 F1554, Grade 36, or ASTM A36 rod; 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

SECTION 05720 –ALUMINUM HANDRAILS AND RAILINGS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Aluminum handrails and railing.

1.2 REFERENCES

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

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

A. Railings Structural Requirements:
   1. Handrail Assemblies and Guards shall be able to resist a single concentrated load of 200 pounds applied in any direction at any point along the top.
   2. Infill area of guardrail system capable of withstanding a horizontal concentrated load of 200 pounds applied to one square foot at any point in the system.
   3. Handrail Assemblies and Guards shall be designed to resist a load of 50 plf applied in any direction at the top, and to transfer this load through the supports to the structure.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 PROJECT CONDITIONS

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

PART 2 – PRODUCTS

2.1 MANUFACTURERS

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

2.2 ALUMINUM RAILINGS

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

2.3 FINISH

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

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2.4 ACCESSORIES

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

2.5 FABRICATION

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

PART 3 –EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION GENERAL

A. Install in accordance with manufacturers instructions and detailed drawings.
B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing handrails and railings. Set handrails and railings accurately in location, alignment, and elevation, measured from established lines and levels.
   1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means.
   2. Align handrails and railing so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
C. Fit exposed connections together to form tight, hairline joints.
D. Corrosion Protection: Coat concealed surfaces of aluminum alloys that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary to secure in-place construction. Separate dissimilar materials with bushings, grommets, or washers to prevent electrolytic corrosion.

3.4 CLEANING

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

3.5 PROTECTION

A. Protect installed products from damage by subsequent construction activities, until completion of Project.

B. Field repair of damaged product finishes with Manufactures painted color touch up only. Return items that cannot be repaired to the manufacturer for repair or replacements.

END OF SECTION 05720

SECTION 06100 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 SUBMITTALS

A. Product Data: Submit for: Air infiltration barrier.
B. Framing Connectors and Supports: Submit manufacturer's standard data demonstrating compliance with building code requirements.
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).
2. B. Stud Framing -- 2 x 4 through 2 x 8: Grade: Stud Grade or better.
C. Joist and Small Beam Framing -- 2 x 6 through 4 x 16:
   1. Species: Spruce-Pine-Fir (SPF), Grade: No. 2.
D. Engineer Lumber:
   1. LVL beams and headers qualified to ASTM D 5456 by APA- The Engineered Wood Association. 1.9E min., 1 ¾" thick, Fb = min. 2,600 psi. For depth other than 12", Fb shall be multiplied by $(12/d)^{1/9}$. Acceptable products include, but are not limited to:
      a. Microllam by Weyerhauser NR Company.
      b. GP Lam by Georgia-Pacific, Inc.
      c. LP Solidstart by Lousiana-Pacific.
E. Miscellaneous Lumber: Provide dimension lumber and boards necessary for the support of work specified in other sections, whether or not specifically indicated, and including but not limited to blocking, nailers, etc.
   1. Lumber: S4S, No. 2 or better, 15 percent maximum (kiln-dry).

2.02 CONSTRUCTION PANELS

3. 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 ½" thick.

2.03 MISCELLANEOUS MATERIALS

A. Fasteners: Provide as required by applicable codes and as otherwise indicated.
   1. Provide fasteners with a hot-dip zinc coating (ASTM A 153) for treated lumber and where wood is in ground contact, subjected to high relative humidity, or exposed to weather.

B. Framing Connectors and Supports: Prefabricated, formed steel units; hot-dip galvanized finish unless otherwise indicated; type and size as required; approved by applicable codes.
   1. The following manufacturer's products, or approved equal, provided they comply the the requirements of the contract documents, will be among those considered acceptable:
      a. Cleveland Steel Specialty Company.
      b. Simpson Strong-Tie Company.
      c. United Steel Products (USP) Company.

C. Saturated Building Felt (30#)

D. Sill Sealer Gaskets: Glass fiber insulation strips; uncompressed thickness, 1 inch (1/32 inch compressed); width to match sill members.

2.04 WOOD TREATMENT BY PRESSURE PROCESS

A. Aboveground Lumber: AWPB LP-2 (waterborne preservatives).
   1. Kiln dried after treatment to 19 percent maximum moisture content.
   2. Treat the following:
      a. Wood in contact with masonry or concrete.
      b. Sill plate.
      c. Other members indicated.

B. Fasteners for Preservative Treated Wood: Hot-dip galvanized steel (ASTM A153).

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Arrange work to use full length pieces except where lengths would exceed commercially available lengths. Discard pieces with defects that would lower the required strength or appearance of the work.

B. Cut and fit members accurately. Install plumb and true to line and level.

C. Fasten carpentry in accordance with applicable codes and recognized standards.

D. Where exposed, countersink nails and fill flush with suitable wood filler.

3.02 MISCELLANEOUS CARPENTRY

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

B. Use countersunk fasteners appropriate to applied loading.

3.03 WOOD FRAMING - GENERAL

A. Comply with sizes, spacing, and configurations indicated. Where not specifically indicated, comply with applicable codes and NFPA "Manual for Wood Frame Construction." Splice members only where specifically indicated or approved.

B. Space fasteners as indicated. Where not specifically indicated, comply with applicable codes and the "Recommended Nailing Schedule" of NFPA "Manual for Wood Frame Construction" and "National Design Specification for Wood Construction."

3.04 INSTALLATION OF CONSTRUCTION PANELS

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

3.05 AIR INFILTRATION BARRIER

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

END OF SECTION 06100

SECTION 06130 - HEAVY TIMBER FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 TIMBER

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

2.2 PRESERVATIVE TREATMENT

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

2.3 TIMBER CONNECTORS

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

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

2.4 MISCELLANEOUS MATERIALS

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

2.5 FABRICATION

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

PART 3 - EXECUTION

3.1 INSTALLATION

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

a. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.

E. Install timber connectors as indicated.

1. Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.

3.2 ADJUSTING

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

END OF SECTION 06130

SECTION 06200 - FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Wood window trim.
B. Melamine shelving
C. Exterior plywood bead board with batten strips
D. Tongue and groove cedar board for Lobby see Section 06250.
E. Fiber-cement lap siding, siding panels, and trim see Section 07462.

1.02 SUBMITTALS

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

PART 2 - PRODUCTS

2.01 WOODWORK

A. All Woodwork Finishes: As indicated on drawings.

2.02 WOOD MATERIALS

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

2.03 MELAMINE SHELVING:

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

2.04 FABRICATION

A. Fabricate in sizes and shapes indicated and using details indicated.

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

PART 3 - EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION – GENERAL

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

3.03 PROTECTION

A. Protect woodwork and column cover from damage and maintain design environmental conditions.

END OF SECTION 06200

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SECTION 06250 - CEDAR

PART 1 - GENERAL

1.01 SUMMARY

A. Wood trim for display case and lobby interior
B. Tongue and groove boards interior.
C. Exterior trim boards.

1.02 SUBMITTALS

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

PART 2 - PRODUCTS

2.01 WOODWORK

A. All Woodwork Finishes: As indicated on drawings.

2.02 WOOD MATERIALS

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

2.03 FABRICATION

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

PART 3 - EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION – GENERAL

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

3.03 FINISHING

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

3.04 PROTECTION

A. Protect woodwork and column cover from damage and maintain design environmental conditions.

END OF SECTION 06200

SECTION 06651 - SOLID SURFACE FABRICATIONS

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITION

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

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.
B. Fabricator/installer qualifications:
   1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.
C. Applicable standards:
   1. Standards of the following, as referenced herein:
      a. American National Standards Institute (ANSI)
      b. American Society for Testing and Materials (ASTM)
      c. National Electrical Manufacturers Association (NEMA)
      d. NSF International
   2. Fire test response characteristics:
      a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
         1) Flame Spread Index: 25 or less.
         2) Smoke Developed Index: 450 or less.

1.6 DELIVERY, STORAGE AND HANDLING

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

1.7 WARRANTY

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

1.8 MAINTENANCE

A. Provide maintenance requirements as specified by the manufacturer.

PART 2 — PRODUCTS

2.1 MATERIALS

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

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

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

2.2. PERFORMANCE CHARACTERISTICS:

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

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

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

2.3 ACCESSORIES

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

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

2.4 FACTORY FABRICATION

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

2.5 FINISHES

A. Select from the manufacturer's standard color chart.
   1. Color: Buried Beach by Corian, basis of design

B. Other acceptable manufacturers (color to be selected by architect)
   1. Wilsonart-Gibraltar
   2. Avonite

PART 3 — EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

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

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

B. Coved backsplashes and applied sidesplashes:
1. Install applied sidesplashes using manufacturer's standard color-matched silicone sealant.
2. Adhere applied sidesplashes to countertops using manufacturer's standard color-matched silicone sealant.

3.3 REPAIR

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

3.4 CLEANING AND PROTECTION

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

END OF SECTION

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.

1.02 DEFINITIONS

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

1.03 SUBMITTALS

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

1.04 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.01 MATERIALS

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

2.02 ACCESSORIES

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

PART 3 - EXECUTION

3.01 INSTALLATION

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

B. Install materials in a manner which will maximize continuity of thermal envelope. Use a single layer of insulation wherever possible to achieve indicated requirements, unless otherwise indicated.
C. Insulation Boards:
   1. Extruded polystyrene insulation:
      a. Foundation installation: Provide installation capable of sustaining subsequent construction work without damage or displacement.
         1. Adhesive: Use insulation manufacturer's recommended adhesive to attach insulation boards to foundation. Maximize contact between board surface and substrate.
      b. Under-slab installation: Do not install insulation before compaction of subgrade is verified. Provide installation capable of sustaining subsequent construction work without damage or displacement.
D. Insulation Blankets/Batts:
   1. Application: Wood-framed construction:
      a. Unfaced insulation: Friction-fit insulation between framing members.
      b. Support ceiling insulation with plastic mesh.

END OF SECTION 07210

SECTION 07411-PREFORMED METAL ROOF PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Architectural roofing system of preformed aluminum panels
B. Fastening system.
C. Factory finishing.
D. Accessories and miscellaneous components.

1.02 RELATED REQUIREMENTS

A. Section 06100 – Rough Carpentry: 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 "**Medium Bronze**" (**Petersen Aluminum**) for all metal items; Valspar Fluoropon SR; solar reflectance <0.31;

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. Facia
E. 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.
F. Underlayment for Wood Substrate: ASTM D 226 roofing felt, perforated type; covered by water-resistant rosin-sized building paper.
G. 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.
H. 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 07462 – FIBER CEMENT SIDING

PART 1GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED SECTIONS

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

1.3 REFERENCES

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

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 PROJECT CONDITIONS

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

1.8 WARRANTY

A. Product Warranty: Limited, non-pro-rated product warranty.
   1. Lap siding for 30 years.
   2. Vertical siding panels for 30 years.
   3. Trim boards for 15 years.

B. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer:
   1. James Hardie-Artisan Lap and Accent Trim, Hardi Panel and Hardi-trim
   2. CertainTeed
   3. Nichiha

B. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01600.

2.2 SIDING

A. Siding requirement for Materials:
   1. Fiber-cement Siding - complies with ASTM C 1186 Type A Grade II.
   2. Fiber-cement Siding - complies with ASTM E 136 as a noncombustible material.
   3. Fiber-cement Siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
   4. Warnock Hersey Product Listing.
   5. Manufacturer's Technical Data Sheet.

B. Lap Siding:
   1. Type: Texture 7-1/4 inches (184 mm) with 6 inches exposure.

C. Vertical Siding:
   1. Type: Cedarmill Vertical siding panel 4 feet by 10 feet.

D. Trim:
   1. Trim boards
      a. Product: Batten Boards, 2-1/2 inch (63 mm) width, rustic texture.
      b. Product: 5/4 Boards, width varies, smooth texture
      c. Product: 1-1/2" thick trim for adjacent to heavy lap siding
      d. Length: 12 feet (3658 mm).

2.3 FASTENERS

A. Wood Framing Fasteners: see manf. requirements

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

2.4 FINISHES

A. Factory Primer: Provide factory applied universal primer.
   1. Primer: Factory primed by James Hardie.

PART 3EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION - Lap Siding

A. Install materials in strict accordance with manufacturer's installation instructions.
B. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inches (32 mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.
C. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
D. Align vertical joints of the planks over framing members.
E. Maintain clearance between siding and adjacent finished grade.
F. Locate splices at least one stud cavity away from window and door openings.
G. Use off-stud metal joiner in strict accordance with manufacturer's installation instructions.
H. Wind Resistance: see structural requirements
I. Face nail to sheathing.
J. Locate splices at least 12 inches (305 mm) away from window and door openings.

3.4 INSTALLATION - Vertical Siding

A. Install materials in strict accordance with manufacturer's installation instructions.
B. Block framing between studs where HardiePanel siding horizontal joints occur.
C. Install metal Z flashing and provide a 1/4 inch (6 mm) gap at horizontal panel joints.
D. Place fasteners no closer than 3/8 inch (9.5 mm) from panel edges and 2 inches (51 mm) from panel corners.
E. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
F. Maintain clearance between siding and adjacent finished grade.
G. Specific framing and fastener requirements refer to Tables 2 and 3 in National Evaluation Service Report No. NER-405.

3.5 INSTALLATION – Trim Boards

A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.
D. Maintain clearance between trim and adjacent finished grade.
E. Trim inside corner with a single board trim both side of corner.
F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.
G. Allow 1/8 inch gap between trim and siding.
H. Seal gap with high quality, paint-able caulk.
I. Shim frieze board as required to align with corner trim..
J. Fasten through overlapping boards. Do not nail between lap joints.
K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten HardieTrim boards to HardieTrim boards.
L. Shim frieze board as required to align with corner trim.

3.6 FINISHING

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

3.7 PROTECTION

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

END OF SECTION

SECTION 07625 - SHEET METAL GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Gutters and downspouts for the new and renovated **Rest Area 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:

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

2.02 ELASTOMERIC SEALANTS

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

2.03 SILICONE-LATEX SEALANTS

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

2.04 SEALANT BACKERS

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

PART 3 - EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION

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

3.03 SCHEDULE OF JOINT SEALERS

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

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

SECTION 08110 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 REFERENCES

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

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's printed product information indicating compliance with specified requirements.
B. Shop Drawings: Submit drawings for fabrication and installation of specified items, coordinated with opening schedule included in contract documents.

1.04 QUALITY ASSURANCE

A. Quality Standard: Comply with SDI 100.

1.05 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Products of the following manufacturers or approved equal, provided they comply with requirements of the contract documents, will be among those considered acceptable:
   1. Benchmark Commercial Door Products.
   2. Curries Company/Essex Industries, Inc.
   3. Steelcraft Manufacturing Company/Masco Industries.

2.02 MATERIALS

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

2.03 FABRICATION

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

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

2.04 STEEL DOORS

A. General: Fabricate steel doors in accordance with requirements of SDI 100.
B. Interior Doors:
   1. 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.

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 08310- ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.1 RELATED SECTIONS

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

1.2 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Manufacturer's data sheets, including:

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store attic access door hatch in manufacturer's unopened packaging until ready for installation.

B. Store attic access door hatch until installation inside under cover in dry area out of direct sunlight.

1.4 WARRANTY

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

PART 2 PRODUCTS

2.1 ACCESS DOOR AND FRAME

A. Non-rated attic access doors and frames
   1. Door: White mineral board face, extruded polystyrene (EPS) R-42 core 10" thick and rubber sealing gasket over top of EPS core. Door is pre-finished.
   2. Frame: plywood frame is installed in a wood framed rough opening. Frame is 12" tall and provides insulation dam.
   3. Trim: Tapered wood trim is pre-finished.
   4. Lock: A 4 point, keyed, locking latch system is incorporated into the door. 4 keys included. (in public areas)
   5. Handles: Two recessed handles

B. Stainless steel vertical access door
   1. Door: 16 ga. Rounded safety corners
   2. Frame: 14 ga. With continuous concealed hinge
   3. Lock: Mortise cylinder, 4 keys included

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PART 3 EXECUTION

3.1 EXAMINATION

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

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

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 08410-METAL-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront 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; **Bronze** painted fluorocarbon, 20-year finish.

2.05 HARDWARE

A. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
B. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
C. Pivots: Center type; top and bottom; provide on all doors.
D. Push/Pull Set: 1" bar, Hager No.160; provide on all doors.
E. Threshold: Aluminum, ¼" high maximum; provide on all doors.
F. Closers: Surface mounted on interior.
   1. Provide on all doors.
G. Locks: Dead latch with turn handle inside; keyed cylinder outside.
   1. Provide on all doors.

2.06 FABRICATION

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

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.
B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
C. Provide alignment attachments and shims to permanently fasten system to building structure.

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

3.03 ERECTION TOLERANCES

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

3.04 ADJUSTING

A. Adjust operating hardware for smooth operation.

3.05 CLEANING AND PROTECTION

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

END OF SECTION

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 Stanley 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: **Bronze** painted fluorocarbon, 20-year finish, to match storefront.

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 08551 – ALUMINUM CLAD WOOD WINDOWS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum-clad wood casement windows.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

A. American Architectural Manufacturers Association (AAMA):
   1. AAMA 502 - Voluntary Specification for Field Testing of Windows and Sliding Doors.
   2. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
   3. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
B. American Society for Testing and Materials (ASTM):
   1. ASTM B 117 - Operating Salt Spray (Fog) Apparatus.
   2. ASTM C 1036 - Flat Glass.
   3. ASTM C 1048 - Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass.
   4. ASTM D 1149 - Rubber Deterioration – Surface Ozone Cracking in a Chamber.
   5. ASTM D 2803 - Filiform Corrosion Resistance of Organic Coatings on Metal.
   6. ASTM D 3656 - Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns.
   7. ASTM D 4060 - Abrasion Resistance of Organic Coatings by the Taber Abraser.
   8. ASTM E 283 - Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Difference Across the Specimen.
   9. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
   10. ASTM E 547 - Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential.
   11. ASTM G 85 - Modified Salt Spray (Fog) Testing.
C. Screen Manufacturers Association (SMA):
   1. SMA 1201 - Specifications for Insect Screens for Windows, Sliding Doors and Swinging Doors.
D. Window and Door Manufacturers Association (WDMA):
   1. ANSI/AAMA/NWWDA 101/I.S.2 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.
   2. ANSI/AAMA/NWWDA 101/I.S.2/NAFS-02 - Voluntary Performance Specification for Windows, Skylights and Glass Doors.
   3. WDMA I.S.4 - Industry Standard for Water-Repellent Preservative Non-Pressure Treatment for Millwork.

1.4 PERFORMANCE REQUIREMENTS

A. Windows shall be Hallmark certified to a rating of [C] [AP]-R-PG[____] specifications in accordance with ANSI/AAMA/NWWDA 101/I.S.2/A440-08.
B. Window Unit Air Leakage, ASTM E 283, 1.57 psf (25 mph): 0.05 cfm per square foot of frame or less.

C. Window Unit Water Penetration: No water penetration through window unit when tested in accordance with ASTM E 547, under static pressure of 7.5 psf (52 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 5 gallons per hour per square foot.

1.5 SUBMITTALS

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

1.6 QUALITY ASSURANCE

A. Mockup:
   1. Provide sample installation for field testing window performance requirements and to determine acceptability of window installation methods.
   2. Approved mockup shall represent minimum quality required for the Work.
   3. Approved mockup shall [not] remain in place within the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Pella Corporation, Andersen, Marvin

2.2 ALUMINUM-CLAD WOOD AWNING WINDOWS

A. Aluminum-Clad Wood Casement Windows: Architect Series factory-assembled aluminum-clad wood windows with outward-opening sash installed in frame
B. Frame:
   1. Select woods, water-repellent, preservative-treated with EnduraGuard® in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the frame.
   2. Interior Exposed Surfaces: Fir
   3. Exterior Surfaces: Clad with aluminum.
   4. Overall Frame Depth: 5 inches (127 mm).
C. Sash:
   1. Select woods, water water-repellent, preservative-treated with EnduraGuard in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the sash.
   2. Interior Exposed Surfaces: Fir
   3. Exterior Surfaces: Clad with aluminum, lap-jointed at corners.

4. Corners: Mortised and tenoned, glued and secured with metal fasteners.
5. Sash Thickness: 1-3/4 inches (45 mm).

D. Weather Stripping:
1. Dual weather stripping.
2. Continuous, flexible, Santoprene material in dual-durometer design.
3. Units shall have welded corners, compressed between frame and sash for positive seal on all 4 sides.
4. Secondary PVC leaf-type weather strip between sash and frame for positive seals on all 4 sides.

2.3 GLAZING

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

2.4 OPTIONS

A. Insect Screens: Standard.
1. Compliance: ASTM D 3656 and SMA 1201.
2. Screen Cloth: Vinyl-coated fiberglass, 18/16 mesh.
3. Set in aluminum frame fitted to inside of window.
4. Complete with necessary hardware.
5. Screen Frame Finish: match

B. Grilles-Between-the-Glass:
1. Profile: 3/4 inch.
2. Contoured aluminum grilles installed between 2 panes of the sealed insulating glass.
3. Interior Grille Color: Ivory
4. Exterior color: Bronze to match

2.5 HARDWARE

A. Operator:
1. Steel worm-gear operator with hardened gears.
2. Operator Base: Zinc die cast with painted finish.
3. Operator Linkage, Hinge Slide, and Hinge Arms: 300 series stainless steel.
4. Exposed Fasteners: Stainless steel.
5. External Hardware Salt Spray Exposure, ASTM B 117: Exceed 1,000 hours.

B. Crank Handle Finish
1. Integrated Folding Crank: Oil-rubbed bronze

C. Locking System: SureLock System.
1. Single-handle locking system.
2. Operate positive-acting arms that reach out and pull sash into locked position.
3. Awning Windows: One installed on sash 29 inches and smaller in frame width, 2 unison operating locks installed on sash over 29 inches in frame width.
4. Lock Handle Finish: Oil -rubbed bronze

2.6 TOLERANCES

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

2.7 FINISH

A. Exterior Finish System:
   1. Exterior aluminum surfaces shall be finished with the following multi-stage system:
      a. Clean and etch aluminum surface of oxides.
      b. Pre-treat with chrome phosphate conversion coating.
      c. Pre-treat with chromic acid sealer/rinse.
      d. Top coat with baked-on 70% fluoropolymer-based enamel.
   2. Color: Bronze, confirm with owner and architect.
   3. Performance Requirements: Exterior aluminum finishes shall meet or exceed all performance requirements of AAMA 2605.
B. Interior Finish: Factory finished with 1 prime coat and 1 top coat color to be determined

2.8 INSTALLATION ACCESSORIES

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

2.9 SOURCE QUALITY CONTROL

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

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

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

G. Seal window to exterior wall cladding with sealant and related backing materials at perimeter of assembly.

H. Leave windows closed and locked.

3.3 CLEANING

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

3.4 PROTECTION

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

END OF SECTION

SECTION 08710 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUBMITTALS

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

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.

PART 4 - SCHEDULE

Manufacturers Code Name:

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

Group # 2

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

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Group # 3				
3 Hinges	TA 2314 4 1/2 X 4 1/2	US32D	Mc	Pemko or Ives Equivalent
1 ADA cup pull	27P	US32D	Ha	Don-Jo or Burns Manuf. Equivalent
1 Thumb Turn Cyl	4066 X 1 1\8"	313	Ad	Schlage or Sargent Equivalent
1 Mortise Cylinder	4036	313	Ad	Schlage or Sargent Equivalent
1 Closer	281 O	26D	Sa	LCN or Dorma Equivalent
1 Protection Plate	K1050 10" X 34"	US32d	Ro	Von Duprin or Hager Equivalent
3 Door Silencer	GJ64	Gray	Gl	Ives or Rockwood Equivalent
Group #4				
3 Hinges	TA 2314 4 1/2 X 4 1/2	US32D	Mc	Pemko or Ives Equivalent
1 Lockset	8237-66 LNJ X 3 Keys	US32D	Sa	Schlage or Best Access Equivalent
1 Closer	281 PS	26D	Sa	LCN or Dorma Equivalent
1 Protection Plate	K1050 10" X 34"	US32D	Ro	Von Duprin or Hager Equivalent
3 Door Silencer	GJ64	Gray	Gl	Ives or Rockwood Equivalent
1 Wall Bumper	409	US32d	Ro	Ives or Rockwood Equivalent
Group #5				
3 Hinges	TA 2314 4 1/2 X 4 1/2	US32D	Mc	Pemko or Ives Equivalent
1 Lockset	8237-27 LNJ X 3 Keys	US32D	Sa	Schlage or Best Access Equivalent
1 Closer	281 PS	26D	Sa	LCN or Dorma Equivalent
1 Protection Plate	K1050 10" X 34"	US32D	Ro	Von Duprin or Hager Equivalent
3 Door Silencer	GJ64	Gray	Gl	Ives or Rockwood Equivalent
1 Wall Bumper	409	US32d	Ro	Ives or Baldwin Equivalent
Group #6				
3 Hinges	TA 2314 4 1/2 X 4 1/2	US32D	Mc	Pemko or Ives Equivalent
1 Lockset	8237-15 LNJ	US32D	Sa	Schlage or Best Access Equivalent
1 Closer	281 PS	26D	Sa	LCN or Dorma Equivalent
1 Protection Plate	K1050 10" X 34"	UD32D	Ro	Von Duprin or Hager Equivalent
3 Door Silencer	GJ64	Gray	Gl	Ives or Rockwood Equivalent
1 Door Stop	474	US26D	Ro	Ives or Baldwin Equivalent
Group # 7				
1 Continuous Hinge	MCK-12HD 83	BZ	Mc	Pemko or Ives Equivalent
1 Flush Bolts	555	US10B	Ro	Ives or Hager Equivalent
1 Deadlock	MS1851SW	313	Ad	Schlage or Sargent Equivalent
1 Thumb Turn Cyl	4066 X 1 1\8"	313	Ad	Schlage or Sargent Equivalent
1 Mortise Cylinder	21 41 1 1/8 Gmk X 3 Keys	US10B	Sa	Schlage or Adams Rite Equivalent
1 Push/Pull Set	RM252 X 33"	US10B	Ro	Ives or Hager Equivalent
1 Closer	281 PS	US10B	Sa	LCN or Dorma Equivalent
1 Saddle Threshold	425 E X 36"	AL	Na	Pemko or Hager Equivalent
Neoprene gasket				
Group #8				
3 Hinges	TA 2314 4 1/2 X 4 1/2	US32D	Mc	Pemko or Ives Equivalent
1 Lockset	8237-27 LNJ X 3 Keys	US32D	Sa	Schlage or Best Access Equivalent
1 Closer	281 PS	26D	Sa	LCN or Dorma Equivalent
1 Saddle Threshold	425 E X 36"	AL	Na	Pemko or Hager Equivalent
Neoprene gasket				
Drip cap				
Group #9				
6 Hinges	TA 2314 4 1/2 X 4 1/2	US32D	Mc	Pemko or Ives Equivalent
1 Flush Bolt	555	US10B	Ro	Ives or Hager Equivalent
1 Lockset	8237-27 LNJ X 3 Keys	US32D	Sa	Schlage or Best Access Equivalent
2 Closer	281 PS	26D	Sa	LCN or Dorma Equivalent
2 Protection Plate	K1050 10" X 34"	US32D	Ro	Von Duprin or Hager Equivalent
6 Door Silencer	GJ64	Gray	Gl	Ives or Rockwood Equivalent

END OF SECTION 08710

SECTION 08800 – GLAZING

PART 1 – GENERAL

1.01 SUMMARY

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

1.02 PERFORMANCE REQUIREMENTS

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

1.03 SUBMITTALS

A. Product Data.
B. Insulating Unit Warranty.

1.04 WARRANTY

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

PART 2 – PRODUCTS

2.01 MANUFACTURERS

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

2.02 GLASS TYPES

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

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: ¼ inch.
1. Provide certified safety glazing and use at display cases.
2. Color: Clear.
   1. Acceptable glazing methods: Sealant, both sides.

D. Glass Type SG - 3: Obscure glass at Unisex Restroom door; thickness: ¼ inch safety glass.

2.03 BASIC GLASS PRODUCTS

A. Sealed Insulating Units: Factory-assembled multiple panes separated by and sealed to spacers forming air-tight, dehydrated air space(s).
1. ASTM E 774, Class B.
2. Spacer seals: Manufacturer's standard.
3. Exception: For structural adhesive glazed units use only a dual seal system, using materials determined by structural adhesive manufacturer to be compatible with structural adhesive.

B. Float Glass: Quality q3, unless otherwise indicated.
1. Heat-strengthened: ASTM C 1048, Kind HS, Type I.

C. Laminated Units: Multiple plies laminated together with interlayer, using heat and pressure, without air pockets or contaminants between plies.
1. Interlayer for all-glass units: Polyvinyl butyral sheet, specifically designed for lamination and with demonstrated long-term ability to maintain physical and visual properties under installed conditions.

D. Polycarbonate Sheet: Rigid, flat polycarbonate sheet; thicknesses as indicated.
1. Flammability: Average extent of burning less than 1 inch, when tested in accordance with ASTM D 635, using the thickness of material to be used on the project.
3. UV- and mar-resistant coating: Apply on all surfaces exposed to air.

A. 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

SECTION 08900 – LOUVERS AND VENTS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 PERFORMANCE REQUIREMENTS

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

1.3 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

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2.2 FABRICATION, GENERAL

A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal High Performance Drainable-Blade Louver

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

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

B. Louver Screen Frames: Same kind and form of metal as indicated for louver to which screens are attached.

C. Louver Screening: Same kind of metal as indicated for louver.

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

2.5 ALUMINUM FINISHES

A. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

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PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.

C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.

E. Protect galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.

END OF SECTION 08 90 00

SECTION 09252 - CEMENTITIOUS BACKER BOARD

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fiber cement backer board panels.

1.2 RELATED SECTIONS

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

1.3 REFERENCES

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

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 PROJECT CONDITIONS

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

1.8 WARRANTY

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

PART 2 PRODUCTS

2.1 MANUFACTURERS

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

2.2 BACKERBOARD

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

2.3 FASTENERS

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

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 WALL FRAMING

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

3.3 PREPARATION

A. Clean surfaces thoroughly prior to installation.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.4 INSTALLATION

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

END OF SECTION

SECTION 09260 - GYPSUM BOARD SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.01 GYPSUM BOARD

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

2.02 TRIM AND ACCESSORIES

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

2.03 JOINT TREATMENT

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

2.04 MISCELLANEOUS MATERIALS

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

PART 3 - EXECUTION

3.01 INSTALLATION OF GYPSUM BOARD

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

B. Installation on Wood Framing:
   1. Single-layer application: Install gypsum board by the following method:
      a. Screw attachment.

3.02 FINISHING

A. General: Comply with ASTM C 840 and GA-216 except where exceeded by other requirements.

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

END OF SECTION 09260

SECTION 09300 - TILE
PART 1 - GENERAL

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

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

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

PART 2 - PRODUCTS

2.01 MATERIALS - GENERAL
A. Colors, Textures, and Patterns, Tile, Grout, and Other Products: **Colors shall match the colors indicated below and as scheduled on drawings**, as manufactured by **Stone Peak Ceramics, Inc.** approved equals . Colors manufactured by a tile company other than that specified, must be approved as equal in color and texture by the Architect and the Roadside Unit. A manufacture other than specified shall submit an actual sample comparison submittal board with their **substitution samples** mounted alongside the specified tile samples for consideration as an equal tile product by the Architect and the Roadside Unit; the proposed substitution submittal board **shall be submitted 10 days prior to the receipt of bids to Weeks Turner Architecture, PA**
Attn: Ginger Anderson
3305 Durham Drive, Suite 109
Raleigh, NC 27603
1. Tile trim and accessories: Match color and finish of adjoining flat tile.

2.02 TILE PRODUCTS
A. **Wall Tile**:
1. The design is based on the following product:
   a. Type 1-Stone Peak, Plane, Travertini
   b. Type 2-Stone Peak, Sky, Moon Sky
   c. Type 3-Precious Gems Belluno Stone Glass, Random Brick Medley, Cappuccino 35
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. 100% Solids Epoxy Grout; complying with ANSI A118.3.
1. Mix in accordance with manufacturer's recommendations.

2. Colors: TBD
B. Approved equals: Custom Building Products or Bonsal or Hydroment

2.05 SEALANTS

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

2.06 MISCELLANEOUS MATERIALS

A. Cementitious Backer Units: See section 09252
B. Tile Cleaner: Product specifically acceptable to tile manufacturer and grout manufacturer for application indicated and as recommended by National Tile Promotion Federation or Ceramic Tile Institute.

2.05 MISCELLANEOUS MATERIALS

A. Cementitious Backer Units: See section 09252
B. Tile Cleaner: Product specifically acceptable to tile manufacturer and grout manufacturer for application indicated and as recommended by National Tile Promotion Federation or Ceramic Tile Institute.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

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

3.02 TILE APPLICATIONS

A. Interior Wall, 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.
   1. Grout: Latex-portland cement.
B. Tolerances: Maximum variation in floor and wall finished surface/sub-structures shall not exceed 1/8" in 10'-0" from the required tile surface plane. All individual tile edges shall align with adjacent tile edges and no greater than a 1/64" offset variation shall be acceptable.

3.03 CLEANING AND PROTECTION

A. Clean tile surfaces after installation is complete.

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

3.04 MAINTENANCE

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

END OF SECTION 09300

SECTION 09662 – EPOXY TERRAZZO FLOORING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions and division 1 specification sections, apply to this section.

B. General contractor or other is to provide water, 220 volt single phase 100 amp breaker & 480 volt 3 phase 60 amp breaker electrical services with hookups and disconnects within 200 feet of any terrazzo area are to be provided by others at no cost to this subcontractor.

C. Testing should be conducted according to ASTM F2170 only (determining relative humidity in concrete slabs using in situ probes. This test should be conducted by an independent tester.)

1.02 SUMMARY

A. Section Includes:
   1. Thin-set epoxy terrazzo flooring including preparation of substrates
   2. Thin-set precast epoxy terrazzo wall base units
   3. Related accessories

B. Related Sections:
   1. Section 03300, Cast-in-Place Concrete
   2. Section 04200, Unit Masonry
   3. Section 07900, Joint Sealants
   4. Section 09900, Painting

1.03 SUBMITTALS

A. Manufacturer's product data for each type of terrazzo and accessory: System will be evaluated on the basis of standards. For tests not listed in published data, manufacturer shall supply missing data according to standard referenced.
   1. Physical properties
   2. Performance properties
   3. Specified tests
   4. Material Safety Data Sheet
   5. Manufacturer's standard warranty

B. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work. Show layout of the following:
   1. Divider strips
   2. Control- and expansion-joint strips
   3. Base and border strips
   4. Precast terrazzo jointing and edge configurations including anchorage details
   5. Terrazzo patterns

C. Samples for initial selection: Manufacturer's color plates showing the full range of colors and patterns available for each terrazzo type indicated.

D. Samples for Verification: Match architect's samples for each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Prepare samples of same thickness and from same material to be used for the work in size indicated below:
   1. Epoxy Terrazzo: Minimum 6" x 6" (152.4 mm x 152.4 mm) sample of each color and type of terrazzo.
   2. Precast Epoxy Terrazzo: Minimum 6" x 6" (152.4 mm x 152.4 mm) sample of each color and type of terrazzo.

3. Accessories: 6" length (152.4 mm) of each kind of divider strip, stop strip, and control joint strip required.

E. Manufacturer Experience:
1. Submit proof of Associate membership in NTMA.
2. Provide a list of at least 5 epoxy terrazzo projects installed during the previous 5 years using material being submitted for this project and of the same scope, complexity, and at least 75% of the square footage.
3. Manufacturer must provide history of providing primary epoxy materials for a minimum of 10 years.

F. Qualification Data: For qualified Installer.
1. Submit proof of Contractor membership in NTMA and provide a list of at least 5 epoxy terrazzo projects installed during the previous 5 years using material being submitted for this project and of the same scope, complexity, and at least 75% of the square footage.
2. **Terrazzo contractor must prequalify prior to bid date.**

G. Material Test Reports: For moisture and / or relative humidity of substrate

H. Maintenance Data: Submit 5 copies of NTMA maintenance recommendations and 5 copies of manufacturer's instructions

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is acceptable to architect and epoxy terrazzo manufacturer to install manufacturer's products.
1. Engage a terrazzo contractor with a minimum of 5 epoxy terrazzo projects installed during the previous 5 years using material being submitted for this project and of the same scope, complexity, and at least 75% of the square footage.
2. Engage an installer who is a Contractor member of NTMA

B. Source Limitations:
1. Obtain primary epoxy terrazzo flooring system materials including membranes, primers, moisture vapor primers, resins, and hardening agents from a single manufacturer with proof of NTMA membership
2. Manufacturer must provide history of providing primary materials for a minimum of 10 years
3. Obtain aggregates, divider strips, sealers, cleaners from source recommended by primary materials manufacturer

C. Pre-installation Conference: Conduct conference at project site to comply with requirements in section 01200 – Project Meetings. Review methods and procedures related to terrazzo including, but not limited to, the following:
1. Inspect and discuss installation procedures, joint details, jobsite conditions, substrate specification, vapor barrier details, and coordination with other trades
2. Review and finalize construction, schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays
3. Review special terrazzo designs and patterns
4. Review dust control procedures
5. Review plans for concrete curing and site drying to enable timely achievement of suitable slab moisture conditions

D. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution
1. Build mockups for terrazzo including accessories
   a. Size: Minimum 100 sq. ft. (9.3 sq. m.) of typical poured-in-place flooring and base condition for each color and pattern **in locations to be directed by Architect**
   b. Approved mockup may become part of the completed work if undistributed at time of substantial completion

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in supplier's original wrappings and containers, labeled with source or manufacturer name, material, or product brand name, and lot number, if any.
B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
   1. Storage temperatures should be between 60°F to 80°F

1.06 PROJECT CONDITIONS

A. Terrazzo contractor shall, prior to surface preparation:
   1. Evaluate slab condition, including slab moisture content and extent of any required repairs.
   2. Maintain the ambient room temperature at 60°F and floor/slab at 50°F or above for a period extending 72 hours before, during, and after floor installation. Concrete to receive epoxy terrazzo shall have cured for at least 28 days and be free of all curing compounds (unless moisture vapor primer is incorporated into the system). Test concrete substrate to determine acceptable moisture levels prior to installation.
B. Acceptable Substrates:
   1. Flatness tolerance: Concrete subfloor shall be flat with a maximum variation from level of $^1/_4$" in any 10 feet. Any irregularity of the surface requiring patching and / or leveling shall be done using an appropriate terrazzo fill and selected aggregates as recommended by NTMA resin systems.
   2. Concrete floor shall be prepared mechanically by shot blasting. Grinding of slab is not sufficient surface preparation. Surface preparation results should achieve a CSP3-CSP5 profile according to International Concrete Repair Institute Guideline No. 03732.
   3. Concrete floor shall receive a steel trowel finish.
   4. Concrete shall be cured a minimum of 28 days. No curing agents are to be used in areas to receive terrazzo.
   5. Concrete slab shall have an efficient moisture vapor barrier (suggested minimum: fiber reinforced 15 mils thickness) directly under the concrete slab. Moisture barrier shall NOT be punctured.
   6. Saw cutting of control joints must be done between 12 – 24 hours after placement of the structural concrete and at a minimum of $^1/_2$ the concrete thickness.
C. General contractor or owner to provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.
D. General contractor or owner to provide protection from other trades prior to final acceptance by Owner.
E. It is preferred that any drywall be installed after the terrazzo is rough ground. If schedule dictates otherwise, be installed $^3/_4$" above the terrazzo thickness to prevent wicking during the polish grinding wet process.

PART 2 – PRODUCTS

2.01 EPOXY TERRAZZO

A. Products: Systems Overview: Resin Systems Epoxy Matrix by: Acceptable Manufacturers:
   1. Terrazzo & Marble Supply Company
   2. General Polymers Brand of Sherwin-Williams
   3. Master Terrazzo Technologies

B. Primer: Moisture Vapor Primer
   1. Physical properties of moisture mitigating primer shall have a maximum of 0.3 perms with 100% RH.

2. Flexible Reinforcing Membrane: Iso-Crack Epoxy Membrane, for substrate crack preparation and reflective crack reduction.
   a. Reinforcement: Fiberglass scrim.
3. Epoxy Matrix: Epoxy matrix and in color required for mix indicated.
   a. Physical properties without aggregates. All specimens cured for 7 days at 75°F plus or minus 2°F and 50% plus or minus 2% RH. This product shall meet the following requirements:

Property	Test Method	NTMA Requirements
Hardness	ASTM D-2240 using Shore-D Durometer	60-85
Tensile Strength	ASTM D-638	3,000 psi min.
Compressive Strength	ASTM D-695 Specimen B cylinder	10,000 psi min.
Flexural Strength	ASTM D-790	Not specified
Chemical Resistance	ASTM D-1308 seven days at room temperature by immersion method	No deleterious effects: ▪ Distilled Water ▪ Mineral Oil ▪ Isopropanol ▪ Ethanol ▪ 0.025 Detergent Solution ▪ 1% Soap Solution ▪ 10% Sodium Hydroxide ▪ 10% Hydrochloric Acid ▪ 30% Sulfuric Acid ▪ 5% Acetic Acid

b. Physical properties with aggregates. For epoxy matrix blended with 3 volumes of Georgia White marble blended 60% #1 chip and 40% #0 chip, ground and grouted with epoxy resin according to installation specifications, finishing to a nominal $^1/_4$" thickness. All specimens cured for 7 days at 75°F plus or minus 2°F and 50% RH plus or minus 2% RH. This finished epoxy matrix shall meet the following requirements:

Property	Test Method	NTMA Requirements
Flammability	ASTM D-635	Self-extinguishing, extent of burning 0.25 inches max.
Thermal Coefficient of Linear Expansion	ASTM D-696	$25x10^{-6}$ inches per inch per degrees to 140°F
Bond Strength	ACI COMM 403, Bulletin 59-43 (pages 1139-1141)	300 psi (100% concrete failure)

4. Aggregates [OPTION: Marble, glass, mother of pearl] Complying with NTMA gradation standards for mix indicated and containing no deleterious or foreign matter.
   a. Abrasion and impact resistance: Less than 40% loss per ASTM C 131.
   b. 24-Hour absorption rate: Less than 0.74%.
   c. Dust content: Less than 1.0% by weight.
   d. Post-industrial or post-consumer recycled content: <**Insert Value**> percent.
5. Finishing Grout: NTMA approved resin systems.

C. Mix: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.
   1. Color and Pattern Schedule: Where the following designations are indicated, provide specified terrazzo matrices matching architect's samples:
      a. TZ1: Field color-custom color # TM 13-2453 including 10% Italian Bodicino, remainder a blend of North American Marbles
      b. TZ2: Accent color "earth" custom color # TM 13-2459
      c. TZ3: Accent color "water" custom color # TM 13-2456, including 10% one sided mirror, 30% recycled glass, remainder a blend of North American Marbles
      d. TZ 4: Accent color "sky" custom color # TM 13-2546, including glass product
      e. Precast Base to match TZ 1

D. Additive: Hardener for 3000 grit finish

2.02 STRIP MATERIALS

A. Thin-set Divider Strips: L-type.
   1. Material **Aluminum**
   2. Guide for commonly used L-type divider strips for thin-set epoxy terrazzo systems:

System Height	Strip Height	Strip Width
		16 gauge
$^3/_8$" System	$^3/_8$"	$^1/_8$" $^1/_4$"

B. Control-Joint Strips: Separate double L-type angles, positioned back to back with minimum $^1/_8$" – $^1/_4$" width between. (Single L-type angle, positioned adjacent to the joint is also acceptable.) Fill joint with 100% solids epoxy joint filler. Fill area between strips with elastomeric joint filler. Match material, thickness, and color of divider strips and depth required for topping thickness indicated. (For buried control joint): Fill saw cut concrete control joint with 100% solids epoxy filler, apply Iso-Crack Membrane 30-40 mils, embed 12" fiberglass fabric reinforcement. Saw cut control joints should be prefilled with hard epoxy and a single "L" divider with the vertical part placed precisely over the cut. If the saw cut control joint opening is $^1/_4$" or wider, the strip treatment should be as a cold-pour construction below.

C. Construction-Joint (Cold-Joint) Strips: Separate double L-type angles back to back with minimum $^1/_8$" – $^1/_4$" width between. Fill joint and area between strips with elastomeric joint filler. Match material, thickness, and color of divider strips and depth required for topping thickness indicated.
D. Isolation-Joint Strips: Separate double L-type angles, positioned back to back with minimum $^1/_8$" – $^1/_4$" width between. Fill area between strips with elastomeric joint filler. Match material, thickness, and color of divider strips and depth required for topping thickness indicated.
E. Accessory Strips: Match divider strip width, material, and color unless otherwise indicated. Use the following types of accessory strips if specified and detailed:
   1. Base-bead strips for exposed top of terrazzo base
   2. Edge-bead for exposed edges of terrazzo
   3. Nosings for terrazzo stair treads and landings

2.03 MISCELLANEOUS ACCESSORIES

A. Strip Adhesive: 100% solids epoxy resin adhesive
   1. Use adhesive that has a VOC content of 50g / L or less when calculated according to 40 CFR 59, subpart D (EPA Method 24)
B. Patching and Fill Material: Fill and selected aggregates as recommended and approved by NTMA Resin Systems
C. Joint Compound: Joint filler, color to be selected by architect to match / compliment terrazzo
D. Cleaner: Clean with a neutral cleaner with pH factor between 7 – 10 specifically designed for terrazzo

2.04 PRECAST TERRAZZO

A. Terrazzo Cove Base:
   1. Precast Epoxy Terrazzo Cove Base: Type ¾" radius , 6" high.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine substrates and areas, with terrazzo contractor present, for compliance with requirements for installation tolerances and other conditions affecting performance.
B. Proceed with installation only after unsatisfactory conditions, including level tolerances, have been corrected.

3.02 PREPARATION

A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.

B. Concrete Slabs:
   1. Provide sound concrete surface free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.
      a. Prepare concrete mechanically by shot-blasting. Grinding of slab is not sufficient surface preparation. Surface preparation results should achieve a CSP3-CSP5 profile according to International Concrete Repair Institute Guideline No. 03732.
      b. Repair or flatten damaged and deteriorated concrete according to Terrazzo Resin Systems Technical Bulletin 008 Substrate Leveling Requirements for Thin-Set Epoxy Terrazzo
      c. Repair cracks and non-expansion joints greater than $^{1}/_{16}$" (1.6 mm) wide according to Resin Systems Technical Bulletin 009 Crack Detailing and Joint Treatments Resin Thin-set Epoxy Terrazzo.
   2. Verify that concrete substrates are visibly dry and free of moisture.
   3. Moisture Testing:
      a. Test for moisture according to ASTM F2170 (determining relative humidity in concrete slabs using in situ probes). Proceed with installation only after substrates have a maximum relative humidity measurement reading less than 80%. If relative humidity measurement reading is greater than or equal to 80%, moisture vapor primer (MVP) is recommended. Apply to terrazzo substrates according to resin systems MVP product data sheet.

3.03 EPOXY TERRAZZO INSTALLATION

A. General:
   1. Comply with NTMA's written recommendations for terrazzo and accessory installation.
   2. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to resin systems epoxy matrix product data sheet and NTMA's "Terrazzo Specifications and Design Guide".
   3. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
   4. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted unless general contractor or owner is prepared to protect the final finish.
B. Thickness: $^{3}/_{8}$" (9.5 mm)
C. Moisture Vapor Primer (MVP): Apply to terrazzo substrates according to resin systems moisture vapor primer product data sheet.
D. Primer: Apply to terrazzo substrates according to resin systems primer product data sheet.
E. Flexible Reinforcing Membrane for cracks only.
   1. Membrane application for isolated cracking. Route out all cracks and fill with 100% solids epoxy. Apply Iso-Crack Epoxy Membrane (spread at 40 mils thickness) across the crack allowing a minimum of 9 inches on either side. Embed fiberglass scrim into wet membrane and saturate with additional membrane..
F. Strip Materials:
   1. Divider and Accessory Strips:
      a. Install strips in adhesive setting bed without voids below strips or mechanically anchor strips as required to attach strips to substrate.
      b. Control-Joint Strips: Separate double L-type angles, positioned back to back with minimum $^{1}/_{8}$" – $^{1}/_{4}$" width between. (single L-type angle, positioned adjacent to the joint is also acceptable.) Fill joint with 100% solids epoxy joint filler. Fill area between strips with elastomeric joint filler. Match material, thickness, and color of divider strips and depth required for topping thickness indicated.
         i. Buried Control Joint: Fill saw cut concrete control joint with 100% solids epoxy filler. Apply Terroxy Iso-Crack Membrane 30-40 mils, embed 12" fiberglass fabric reinforcement.
         ii. Eliminate double L and filler at control joints unless opening at saw cut is 1/4' or greater.
      c. Construction-Joint (Cold-Joint) Strips: Separate double L-type angles, positioned back to back with minimum $^{1}/_{8}$" – $^{1}/_{4}$" width between. Fill joint and area between strips with

elastomeric joint filler. Match material, thickness, and color of divider strips and depth required for topping thickness indicated.

d. Isolation-Joint Strips: Separate double L-type angles, positioned back to back with minimum $^1/_8$" – $^1/_4$" width between. Fill area between strips with elastomeric joint filler. Match material, thickness, and color of divider strips and depth required for topping thickness indicated.

G. Placing Terrazzo:
1. Mix epoxy matrix with chips and fillers in ratios directed by resin systems.
2. Trowel-apply terrazzo mixture over epoxy primer to provide a dense flat surface to top of divider strips. Allow to cure per Resin Systems recommendations before rough grinding.

H. Rough Grinding: Grind with 60 grit & 150 Diamond matrix stones until all terrazzo strips and marble chips are uniformly exposed.

I. Grouting:
1. Cleanse floor with clean water and rinse.
2. Remove excess rinse water by wet vacuum, dry, and fill voids with resin systems epoxy matrix or clear resin.
3. Allow grout to cure. Grout may be left on terrazzo until other trades work is completed. Remove excess grout with 150 grit diamonds and then follow with 200 grit diamonds.

J. Polishing: Grinding with 400-grit diamonds and incremental increses up to 3000 grit diamonds until all grout is removed from surface. Repeat rough grinding, grout coat, and polishing if large terrazzo chip voids exist after initial polishing. Produce surface with a minimum of 70% aggregate exposure. **Resulting surface to be such that no sealing is required.**

3.04 PRECAST TERRAZZO INSTALLATION

A. Install precast units using method recommended by NTMA and manufacturer unless otherwise indicated.

B. Seal joints between units with joint sealants.

3.05 CLEANING AND PROTECTION

A. Cleaning: Remove grinding dust from installation and wash all surfaces with cleaner.

B. The General Contractor shall protect terrazzo flooring from damage until project completion; any damage that does occur shall be the responsibility of the General Contractor to repair or replace to the satisfaction of the Architect.

END OF SECTION 09662

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 fuel cure as indicated by manufacturer's instructions.

1.07 COORDINATION

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

1.08 MAINTENANCE STOCK

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The brand-name products listed in the schedule at the end of this section and made by the following manufacturer of Low or No V.O.C. paints are the basis of the contract documents:
   1. **Benjamin Moore & Company - Pristine EcoSpec.**

B. Products of the following manufacturers or approved equal, provided they comply with requirements of the contract documents, will be among those considered in accordance with standard substitution procedures:
   1. Devoe & Raynolds Company - Lifemaster.
   2. Sherwin Williams Company - Health Spec.
   3. The Glidden Company* - Lifemaster.

2.02 PRODUCTS

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

PART 3 - EXECUTION

3.01 INSPECTION

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

3.02 SURFACE PREPARATION

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

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

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

3.03 MIXING AND THINNING

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

3.04 APPLICATION

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

3.05 PRIME COATS

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

3.06 FINISH COATS

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

3.07 CLEANING AND PROTECTION

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

3.08 SCHEDULE OF COATINGS FOR INTERIOR NONTRAFFIC SURFACES

A. **Gypsum Wallboard: Walls.**
   1. Latex acrylic, Eggshell finish.
      a. Bottom coat: Airless High-Build Flat Interior Primer / Finish; 1.1DFM.
      b. Intermediate coat: Same as top coat.
      c. Top coat: High Performance Waterborne Acrylic Eggshell Enamel (color **# HC-114 Saybrook Sage**
B. **Wood: Doors & frames, windows, horizontal band, trim, display cabinet, shelving.**
   1. Varnish, satin
      a. Stain: Interior Oil Wood Finishing Stain, (color to be selected).
      b. Bottom and intermediate coats: WoodPride 1908 Interior Polyurethane Gloss Varnish.
      c. Top coat: Interior Polyurethane Satin Varnish.

3.09 SCHEDULE OF COATINGS FOR EXTERIOR NONTRAFFIC SURFACES

A. **Fiber-Cement: Lap siding & trim;**
   1. Acrylic / Latex, flat.
      a. Bottom coat: Same as top coat.
      b. Top coat: Exterior Acrylic Flat Finish; 1.5 DFM.
         (Siding & trim color shall paint over the fiber-cement to be selected

B. **Fiber-Cement: Vertical siding & trim;**
   1. Acrylic / Latex, flat.
      a. Bottom coat: Same as top coat.
      b. Top coat: Exterior Acrylic Flat Finish; 1.5 DFM.
         (Siding & trim color shall paint over the fiber-cement to be selected

C. Plywood Bead board and Batten Strips
   a. Bottom coat: Same as top coat.
   b. Top coat: Exterior Acrylic Flat Finish; 1.5 DFM.

D. Cedar Truss and trim boards
   a. Two coats waterproofing sealer

END OF SECTION 09900

SECTION 10100 - VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Tack boards, see Detail on Sheets A1.5 & A2.10 and Section 06200-Finish Carpentry.

1.02 SUBMITTALS

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

1.03 PROJECT CONDITIONS

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

PART 2 – PRODUCTS

2.01 MATERIALS

A. Natural Cork Tack Boards: 4-30"x72" Display Units;
   1. Seamless, ¼-inch-thick cork sheet, laminated to ¼-inch-thick hardboard.
B. Wood Trim: See Section 06200-Finish Carpentry and Section 09900-Painting for stain and varnish.
C. Adhesives: As recommended by manufacturer for the materials and substrates to be joined.
A. 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 to be determined.
      b. Sanymetal, color to be determined.
      c. **Scranton Products.*:** "color to be determined" for all Toilet partitions and for all changing tables or approved equal; **www.scrantonproducts.com**.
   3. Hardware, head rails, heat-sink, shoes, and accessories. Manufacturer's standard styles. The following materials will be acceptable:
      a. Chromium-plated nonferrous cast alloy ("Zamac").
      b. Extruded aluminum, anodized and polished and stainless steel shoes.

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

2.03 ACCESSORIES

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

PART 3 - EXECUTION

3.01 INSTALLATION

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

END OF SECTION 10170

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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: Black
   3. Character Thickness: 1/32 inch minimum raised letters.
   4. Height: 5/8 inch minimum.
   5. Edges: Square.
   6. Character Font: Helvetica.
   7. Character Case: Upper case only.

2.03 INDIVIDUAL METAL LETTERS

A. Material: **Aluminum plate** with brushed mill finish:
   1. Thickness: 1/4 inch.
   2. Height: 10 inches.
   3. Edges: Square.
B. Character Style:
   1. Character Font: Helvetica.
   2. Character Case: Upper case only and solid arrows.

3. Surface mount to Beadboard panels.

2.04 ACCESSORIES

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

2.05 SIGN SCHEDULE:

A. Sign custom aluminum plaques shall read as follows:

Location/Room No.	Copy	Quantity
	FAMILY ROOM**	1
	KNOCK BEFORE ENTRY	
	WOMEN *	2
	MEN *	2
	Fire extinguisher is located inside Storage room	1
	STORAGE	1

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

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
1. Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
2. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
3. Install project sign in locations indicated and using mounting methods indicated.

B. Aluminum Plaques and Individual Letters:
1. Mount plaques using the standard method recommended by the manufacturer for the type of wall surface indicated (stainless steel or aluminum screws and double sided tape).
2. Concealed mounting: Use double-sided foam tape and mount plaques at 60" above the floor adjacent to doors 2" from the latch side of the jamb for plaques and center individual letters as indicated.

3.02 CLEANING AND PROTECTION

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

END OF SECTION 10425

SECTION 10522 - FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY
A. Fire extinguishers and cabinet located in Storage room.

1.02 SUBMITTALS
A. Product Data.
B. Operating and Maintenance Data.

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

PART 2 - PRODUCTS

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

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

c. Surface mounted door handle, finished to match door.
d. Friction or roller catch.

5. Trim (box flange or frame): Aluminum, satin anodized.

6. Manufacturer's standard vertical lettering identifying contents of cabinet.
   a. Letters silk screen painted.
   b. Letter color: Red.
7. Box: Aluminum sheet.

C. Hinges: Provide hinges for each door; concealed or continuous type; allow full 180 degree opening of door.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prepare openings for recessed cabinets.

3.02 INSTALLATION

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

END OF SECTION 10522

SECTION 10810 - TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

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

1.02 SUBMITTALS

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

2.02 TOILET ACCESSORIES

A. Toilet Paper Dispensers:
   1. Basis of design: Model B-4288 Bobrick.
      a. "Contour" surface-mounted twin-roll toilet tissue dispenser, holds 2-rolls up to 5-1/4" diameter, extra roll drops in place.
B. Automatic Soap Dispenser
   1. Basis of design: Model U135EA, AJW.
C. Grab Bar 36:
   1. Basis of design: B-6806.99 - 36".
      a. Stainless steel, nonslip gripping surface and concealed mounting, Model B-5806.99, by Bobrick.
D. Grab Bar 42:
   1. Basis of design: B-6806.99 - 42".
      a. Stainless steel, nonslip gripping surface and concealed mounting, Model B-5806.99, by Bobrick.
E. Grab Bar 18:
   1. Basis of design: B-5806.99 - 18".
      a. Stainless steel, nonslip gripping surface and concealed mounting, Model B-5806.99, by Bobrick.
F. Semi-Recessed Sanitary Napkin Disposal:
   1. Basis of design: B-4353 Bobrick.
      a. Stainless steel.

b. Single end compartments.

G. Partition Mounted Sanitary Napkin Disposal:
1. Basis of design: B-4354 Bobrick.
a. Stainless steel.
b. Serves 2-compartments.

H. Recessed Towel Dispenser and Waste Receptacle: 600 C-fold paper towels, 18 gallon waste capacity bottom cabinet, locking doors/cabinets, recessed flush with wall, stainless steel; no sharp edges, seamless wall flanges, concealed piano hinges.
1. Product: B-43944 manufactured by Bobrick.

J&K. Mirrors (and Shelf): Stainless steel framed, ¼" thick float glass mirror (provide a 2-year warranty from mirrored glass from staining or delaminating and frame rusting); lavatory mirror with 22-gage stainless steel shelf.
1. Size: 18' x 30" with shelf and 18" x 60".
2. Frame: Radius edges, with mitered and welded and ground corners, and tamperproof hanging system; burr free satin finish.
3. Product: Model B-166 1830 and B-290 2460 manufactured by Bobrick.

L. Hand Dryers:
1. Basis of design: Surface mounted sensor hand dryer "Xlerator" Model XL-SB, by Excel
a. Automatic hand dryer, stainless steel finish.
b. Mount 48" above finish floor.

M. Combination Utility Shelf/Mop and Broom Holder:
1. Basis of design: B-223 x 24" long.
a. Stainless steel with 3 mop holders.
b. With 3-spring loaded rubber cam mop/broom holders, Model B-223x24, by Bobrick.

2.03 MATERIALS

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

2.04 FABRICATION

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

PART 3 - EXECUTION

3.01 INSTALLATION

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

END OF SECTION 10810

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DIVISION 15A - PLUMBING

15010	Basic Plumbing Requirements
15140	Hangers and Supports
15190	Plumbing Identification
15250	Plumbing Piping Insulation
15410	Plumbing Piping
15430	Plumbing Specialties
15450	Water Heaters
15452	Solar Water Heating System

SECTION 15010 - BASIC PLUMBING REQUIREMENTS 307

PART I - GENERAL

1.1 GENERAL CONDITIONS

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

1.2 GENERAL REQUIREMENTS

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

1.3 ALTERNATES

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

1.4 INTENT

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

1.5 DEFINITIONS

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

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

1.6 VISIT TO THE SITE

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

1.7 REGULATORY REQUIREMENTS

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

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1.8 PERMITS AND FEES

A. NA

1.9 DRAWINGS AND SPECIFICATIONS

A. The Plumbing Drawings and Specifications are intended to cover all the work enumerated under the respective headings. The drawings are diagrammatic only. No Contractor shall take advantage of conflict or error between Drawings and Specifications, or between General Drawings and Mechanical, Plumbing and/or Electrical Drawings, but shall request a clarification of such from the Architect/Engineer, should this condition exist. If there is insufficient time to issue an Addendum for this clarification, the Plumbing Contractor shall figure on the most expensive of the items in conflict.

B. The Plumbing Contractor shall refer to the Architectural and Structural Drawings and Specifications for the general construction of the building, for floors and ceiling heights, for locations of walls, partitions, beams, etc., and shall be guided accordingly for setting of all sleeves, inserts and equipment. The Plumbing Contractor shall not under any circumstances scale drawings for the location of equipment. The Plumbing Contractor shall verify the locations of all utility services.

C. The Plumbing Contractor shall keep at least one set of corrected Shop and Design Drawings at the site. Drawings are to be current, denoting approved modifications and actual installed departure. Submit drawings to Architect/Engineer before final payment is made.

1.10 SUPERVISION

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

PART II - PRODUCTS

2.1 STANDARD PRODUCTS

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

2.2 SUBMITTAL

A. The Plumbing Contractor shall submit, for approval, detailed shop drawings on all major equipment and where requested. No materials or equipment may be delivered to the job site or installed until the Plumbing Contractor has in his possession the approved shop drawing for the particular material or equipment. The Plumbing Contractor shall furnish the number of copies required by the General or Special Conditions of the contract, but no case less than six (6) copies.

B. Submitted material shall be properly labeled indicating specific service for which material or equipment to be used, section and article number of specifications governing, Contractor's name and name of job.

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

2.3 SUBSTITUTIONS

A. Manufacturer's lists are to establish a standard of quality and not intended to limit the selection to these manufacturers. All materials and equipment which are essential and have not been specified or shown, shall be new and of the highest grade and quality and free from defect or other imperfections. It should be understood that where the words "furnished and installed" are used, it is intended that the Plumbing Contractor shall purchase and install all materials required.

B. All materials and equipment proposed as substitutes for these specified shall require a ten (10) day prior approval from the Engineer prior to the bid date. No substitutions will be allowed after the ten (10) day period before the bid date.

2.4 PRODUCT HANDLING

A. Equipment and materials shall be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored and protected in accordance with the manufacturer's recommendations and as approved by the Architect/Engineer. Equipment installed with a factory finish shall be fully protected during construction and shall be maintained free of dust, dirt, and foreign matter. Dents and other surface damage shall be repaired or replaced to the satisfaction of the Architect/Engineer at no additional cost to the Owner.

B. The Plumbing Contractor shall clean up and remove from the job site all waste materials, packaging, crating, and refuse resulting from his work on a daily basis.

2.5 MATERIALS AND WORKMANSHIP

A. The Plumbing Contractor shall perform a first class job, both in material and workmanship. None other will be accepted. Deviations from either will be corrected by the Plumbing Contractor at the Plumbing Contractor's expense.

B. The material used throughout the work, except when otherwise noted, shall be new and of the best of its kind. No substitutes shall be used unless approved by the Architect/Engineer. All work shall be executed with a maximum speed consistent with safety and good workmanship.

C. Any equipment furnished by the Plumbing Contractor that is larger than those indicated on the drawings and described in these Specifications or have different electrical characteristics, the increase in cost to the Electrical Contractor for larger wires, conduit, circuit breakers, switches, etc. or for changes in work already installed shall be borne by the instigating Contractor.

PART III - EXECUTION

3.1 EXCAVATION AND BACKFILL

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

3.2 SCAFFOLDING, RIGGING AND HOISTING

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

3.3 CUTTING AND PATCHING

A. The Plumbing Contractor shall provide all cutting and patching necessary to install the work specified in this section. The patching shall match adjacent surfaces.

B. No structural member shall be cut without the approval of the Engineer, and all such cutting shall be done in a manner directed by him.

3.4 EQUIPMENT SPACE AND ARRANGEMENT

A. The equipment shall fit into the space allotted and shall allow adequate clearance for entry, installation, replacement, servicing, and maintenance. The Plumbing Contractor shall coordinate the work to ensure that equipment may be moved into place without altering building components or other installations. Access space shall not be less than the equipment manufacturer's requirements.

B. These drawings indicate the extent and general arrangement of equipment, piping, and ductwork. If any departures are deemed necessary by the Plumbing Contractor, details of such departures and the reasons therefore shall be submitted to the Architect/Engineer for approval as soon as practicable and within 30 days after award of the contract. No departure shall be made without written approval of the Architect/Engineer.

3.5 DAMAGE TO WORK ALREADY IN PLACE

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

3.6 JURISDICTION OF WORK

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

3.7 COORDINATION WITH OTHER TRADES

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

shall verify at the site all locations, grades, elevations, and utility service connections indicated. Any conflicts due to lack of proper coordination shall be brought to the attention

of the Architect/Engineer for resolution. The Plumbing Contractor shall make required changes or relocations at no additional cost to the Owner.

B. Installation, inspection, and testing of work above ceilings shall be completed and approved by the Architect/Engineer prior to installation of the specified finished ceilings. However, ceiling suspension system may be installed as required for coordination.

C. The Plumbing Contractor shall consult with the other trades at the start of the work and periodically thereafter, as required to properly coordinate the various items of work, and to avoid interferences. Should any interferences of any nature develop as the work progresses, such interferences shall be resolved and eliminated as directed. The cost of any work directed shall be borne by the Subcontractor or Contractors directed to do this work.

3.8 DIVISION OF WORK

A. This paragraph is intended to show exactly the point of division of work between the Electrical Division and the Plumbing Division.

B. All equipment covered in the Plumbing Division of the specifications shall be furnished, mounted, and aligned under the Plumbing Division. All individual motor starters, unless indicated as part of a motor control center, for this equipment shall be furnished and installed by the Plumbing Contractor.

C. All final electrical connections to equipment covered in the Plumbing Division of the specifications shall be completed under the Plumbing Division.

D. The Electrical Contractor shall provide a disconnect switch or junction box for each item of equipment under Division 16.

E. Electrical equipment and wiring that is provided by the Plumbing Contractor shall be in accordance with the Electrical specification.

3.9 EQUIPMENT INSTALLATION

A. Final connections to equipment, including pipe, duct, and controls, shall be provided under applicable sections of this Division, unless otherwise specified or indicated.

B. Manufacturer's Instructions: Equipment shall be installed as recommended by the manufacturer to conform to the requirements of the particular application, in accordance with these drawings and specifications.

3.10 OPERATION AND MAINTENANCE MANUALS

A. One complete manual as outlined herein shall be submitted for approval before conducting instruction sessions in operation, before systems or equipment tests are performed, and before final or beneficial occupancy.

B. Manuals shall have rigid covers and index tabs for each major piece of equipment, auxiliaries, and systems. The following shall be inscribed on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the building, the name of the Section, such as "Plumbing" and the name of the Plumbing Contractor. Two copies of each approved manual shall be submitted to the Owner and one copy shall be submitted to the Architect/Engineer.

C. Each piece of equipment shall be listed and identified with the same name, mark, number, or other identification as noted or scheduled in the Contract Documents.

D. Manuals shall include the following:

1. Complete operating installations, covering start-up and shutdown for all components installed.

2. Legible copies of all shop drawings. Any comments incorporated in "as noted" approvals of shop drawings shall be recorded on the drawings included in the manuals.

3. All equipment Maintenance and Service Manuals.

E. A complete parts list for each piece of equipment.

F. All descriptive literature for the equipment.

G. Operating characteristics, performance data, ratings, and curves for each piece of equipment.

H. Internal wiring and control diagrams.

I. All other information pertinent to the maintenance and servicing of equipment and systems provided in the project.

J. Name, address, and telephone number for service on each manufacturer's equipment.

3.11 OPERATING INSTRUCTIONS

A. After all equipment and services are in operation, and the Operation and Maintenance Manuals are available, an instruction and training session shall be conducted for the Owner's operating personnel.

B. Instruction sessions shall be conducted during the Owner's normal working periods, and at times and locations satisfactory to the Owner.

3.12 EQUIPMENT START-UP

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

3.13 GUARANTEE

A. The Plumbing Contractor shall present to the Owner a written guarantee covering his work, including all equipment, material and workmanship. This guarantee shall be against all defects in any of the above work, and shall run for a period of one (1) year from the date of written acceptance of the Contractor's work.

B. Any defective work, equipment, material and/or workmanship that develops within the guarantee period, which is not caused by ordinary wear or abuse by other persons, shall be replaced by the Plumbing Contractor without cost to the Owner.

3.14 FINAL INSPECTION

A. When the entire Contract has been completed and the work is ready for final inspection, the Architect/Engineer or his duly authorized representative will make the inspection. At

the time of inspection, the Plumbing Contractor shall demonstrate to the

Architect/Engineer that the various systems and pieces of equipment have been adjusted to operate in accordance with the requirements of the Contract.

3.15 FINAL PAYMENTS

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

END OF SECTION 15010

SECTION 15140 - HANGERS AND SUPPORTS

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

PART II - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Hangers: Galvanized carbon steel, adjustable, clevis

B. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

C. Vertical Support: Steel riser clamp

D. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

E. Shield for Insulated Piping 2 Inches and Smaller: 18 gauge galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.

F Sheet metal saddles must be 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. Galvanized Steel Hanger Rods: Threaded both ends or continuous threaded.

2.3 FLASHING

A. Metal Flashing: 26 gauge galvanized steel

B. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

C. Flashing shall be compatible with the roofing material and be coordinated with the General Contractor.

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:

PIPE SIZE	HANGER SPACING	MAXIMUM DIAMETER
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 ½ inch space between finished covering and adjacent work

H. Place a hanger within 12 inches of each horizontal elbow.

I. Use hangers with 1½ inch minimum vertical adjustment

J. Support riser piping independently of connected horizontal piping.

K. Hangers shall be galvanized steel or copper.

3.5 FLASHING

A. Provide flashing and counter-flashing where piping penetrates weather-proofed walls, floors and roofs.

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

3.6 SLEEVES

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Design hangers without disengagement of supported pipe

C. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with fire stopping insulation and caulk seal air-tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

D. Install chrome plated steel or stainless steel escutcheons at finished surfaces.

E. Pipe strapping will not be allowed.

END OF SECTION 15140

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 by identified with plastic tags

F. Controls: Identify control panels and major control components outside panels with plastic nameplates.

G. Piping: Identify piping, concealed or exposed, with plastic tape pipe markers. Tags may be used on small diameter piping. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION 15190

SECTION 15250 - PLUMBING PIPING INSULATION

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes Plumbing Pipe Insulation.

1.3 QUALITY ASSURANCE

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

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

1.4 SEQUENCING AND SCHEDULING

A. Schedule insulation application after testing of piping systems.

B. Schedule insulation application after installation and testing of heat trace tape.

PART II - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

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

2.2 GLASS FIBER

A. Material: Inorganic glass fibers, bonded with a thermosetting resin. Jacket: All purpose, factory applied, laminated glass fiber- reinforced, flame retardant Kraft paper and aluminum foil having self-sealing lap.

B. Preformed Pipe Insulation: ASTM C 547, Class 1, rigid pipe insulation, jacketed.

1. Thermal Conductivity: 0.26 average maximum at 75 degrees F mean temperature.

2. Density: 10 average maximum.

C. Adhesive: Produced under the UL Classification and Follow-up Service.

1. Type: Non-flammable, solvent-based.

2. Service Temperature Range: Minus 20 degrees to 180 degrees F.

2.3 INSULATING CEMENTS

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

1. Thermal Conductivity: 1.2 average maximum at 400 degrees F mean temperature.

2. Compressive Strength: 100 psi at 5 percent deformation.

2.4 ADHESIVES

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

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

2. Class 2, Grade A for bonding glass fiber insulation to metal surfaces.

2.5 JACKETS

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

1. Adhesive: As recommended by insulation manufacturer.

2.6 SEALING COMPOUNDS

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

1. Water Vapor Permeance: 0.08 perm maximum

2. Temperature Range: Minus 20 degrees to 180 degrees F

PART III - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION - GENERAL

A. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.

B. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.

C. Keep insulation materials dry during application and finishing.

D. Apply insulation continuously over fittings, valves and specialties.

E. Apply insulation with a minimum number of joints.

F. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.

2. Cover circumferential joints with butt strips, at least three (3) inches wide, and of same material as insulation jacket. Secure with adhesive and outward clinching staples along both edges of butt strip and space 4 inches on center.

3. Longitudinal Seams: Overlap seams at least 1½ inches. Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at four (4) inches on center.

4. Vapor Barrier Coatings: Apply on seams and joints, over staples, and at ends butt to flanges, unions, valves, and fittings.

5. At penetrations in jackets for thermometers and pressure gauges, fill and seal voids with vapor barrier coating.

6. Repair damaged insulation jackets, except metal jackets, by applying jacket material around damaged jacket. Adhere, staple, and seal. Extend patch at least 2 inches in both directions beyond damaged insulation jacket and around the entire circumference of the pipe.

G. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire rated walls and partitions.

H. Flanges, Fittings, and Valves: Apply pre-molded, pre-cut, or field fabricated segments of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.

1. Use same material and thickness as adjacent pipe insulation.

2. Overlap nesting insulation by 2 inches or 1 pipe diameter, whichever is greater.

3. Apply materials with adhesive, fill voids with mineral fiber insulating cement. Secure with wire or tape.

4. Insulate elbows and tees smaller than three (3) inches pipe size with pre-molded insulation.

5. Insulate elbows and tees Three (3) inches and larger with pre-molded insulation or insulation material segments. Use at least three (3) segments for each elbow.

6. Cover insulation, except for metal jacketed insulation, with PVC fitting covers and seal circumferential joints with butt strips.

J. Hangers and Anchors: Apply insulation continuously through hangers and around anchor attachments. Install saddles, shields, and inserts as specified.

1. Inserts and Shields: Cover hanger inserts and shields with jacket material matching adjacent pipe insulation.

3.3 GLASS FIBER INSULATION INSTALLATION

A. Bond insulation to pipe with lagging adhesive.

B. Seal exposed ends with lagging adhesive.

C. Seal seams and joints with vapor barrier compound.

3.7 PIPE INSULATION SCHEDULES

PIPING	INSULATION TYPE	THICKNESS IN INCHES
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

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PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes plumbing piping systems to a point shown on the civil drawings. Systems include the following:

1. Potable water distribution, including cold and hot water supply and hot water circulation.

2. Sanitary Drainage and Vent Systems.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with the following minimum working pressure ratings, except where indicated otherwise:

1. Water Distribution Systems, Below Ground: 150 psig.

2. Water Distribution Systems, Above Ground: 125 psig.

3. Soil, Waste and Vent Systems: 10-foot head of water

PART II - PRODUCTS

2.1 SANITARY SEWER PIPING - BURIED

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

2.2 SANITARY SEWER PIPING - ABOVE GRADE

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

2.3 WATER PIPING - BURIED

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

2.4 WATER PIPING - ABOVE GRADE

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

2.5 MANUFACTURERS

A. Acceptable Manufacturers-Valves:

1. Crane

2. Grinnell

3. Nibco

4. Apollo

2.6 GATE VALVES

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

PART III - EXECUTION

3.1 PREPARATION

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

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

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

3.2 INSTALLATION

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

B. Route piping in orderly manner and maintain gradient.

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

D. Group piping whenever practical at common elevations.

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

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

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

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

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

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

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

L. Excavate in accordance with Sections 15010.

M. Backfill in accordance with Sections 15010.

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

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

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

3.3 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.

C. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

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

3.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

B. Inject disinfectant solution containing 100 ppm of available chlorine and allow to stand for 2 hours before flushing.

C. Flush disinfectant from system until residual is equal to that of incoming water or 1.0 mg/L.

E. Take samples from outlets and analyze in accordance with AWWA C601. Contractor shall engage an independent laboratory to conduct bacteriological and post chlorination tests certifying that the water meets the quality of drinking water. After acceptance by the Engineer of Record, "The Water Test Report for Use" is required to be submitted to SCO prior to requesting the Occupancy Permit.

3.5 SERVICE CONNECTIONS

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

END OF SECTION 15410

SECTION 15430 - PLUMBING SPECIALTIES 328

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

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PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data including rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties, and accessories, and indicating dimensions, required clearances, and methods of assembly of components, and piping and wiring connections.

PART II - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

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

2.5 COMMERCIAL ELECTRIC WATER HEATERS

A. Factory assembled and wired, electric, [vertical] [horizontal] storage type, 150 psig maximum working pressure.

B. Glass lined welded steel tank; four (4) inch diameter inspection port, thermally insulated with minimum two (2) inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.

C. Brass water connections and dip tube, drain valve, high-density magnesium anode, and ASME rated temperature and pressure relief valve.

D. Flange-mounted immersion heating electrical elements; individual elements sheathed with Incoloy corrosion- resistant metal alloy, rated less than 75 Watts per square inch.

2.6 IN-LINE CIRCULATOR PUMPS

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

B. Impeller: Bronze

C. Shaft: Alloy steel with integral thrust collar and two (2) oil lubricated bronze sleeve bearings.

D. Seal: Carbon rotating against a stationary ceramic seat.

E. Drive: Flexible coupling

2.7 THERMAL EXPANSION TANKS

A. Construction: Welded steel, tested and stamped in accordance with Section 8D of ANSI/ASME Code; supplied with National Board Form U-1, rated for working pressure of 125 psig, maximum operating temperature 210 degrees F., with flexible EPDM diaphragm sealed into tank.

B. Accessories: Pressure gage and air-charging fitting, tank drain; pre-charge to 55 psig.

C. Size: 10.5" diameter, 16" overall length, 5 gallon capacity.

PART III - EXECUTION

3.1 WATER HEATER INSTALLATION

A. Install water heaters in accordance with manufacturer's instructions and to UL requirements.

B. Coordinate with plumbing piping and related [fuel piping] [gas venting] [electrical] work to achieve operating system.

3.2 PUMP INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide air cock and drain connection on horizontal pump casings.

C. Decrease from line size, with long radius reducing elbows or reducers. Support piping adjacent to pump such as that no weight is carried on pump casings.

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

END OF SECTION 15450

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 closed loop glycol design including a heat exchange tank, collectors, multi-speed pump, mixing valve, glycol solution, 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) Rheem.
   (b) A.O. Smith Water Products Co. Div.
   (c) Bradford White

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.

2.2 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.

2.3 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. Multi-speed motor.

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.

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, glycol solution 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

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DIVISION 15B: MECHANICAL

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

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SECTION 15500 BASIC MECHANICAL REQUIREMENTS

PART I - GENERAL

1.1 GENERAL CONDITIONS

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

1.2 GENERAL REQUIREMENTS

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

1.3 ALTERNATES

A. Carefully examine all Alternates at the back of this Specification to determine if any work described under the Mechanical Section will be affected thereby.

1.4 INTENT

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

1.5 DEFINITIONS

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

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

1.6 VISIT TO THE SITE

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

1.7 REGULATORY REQUIREMENTS

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

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

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shall be at no additional cost to the Owner.

3.13 GUARANTEE

A. The Mechanical Contractor shall present to the Owner a written Guarantee covering his work, including all equipment, material and workmanship. This Guarantee shall be against all defects in any of the above work, and shall run for a period of one (1) year from the date of written acceptance of the Contractor's work.

B. Any defective work, equipment, material and/or workmanship that develops within the Guarantee period, which is not caused by ordinary wear or abuse by other persons, shall be replaced by the Mechanical Contractor without cost to the Owner.

3.14 FINAL INSPECTION

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

3.15 FINAL PAYMENTS

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

END OF SECTION 15500

SECTION 15501 - HANGERS AND SUPPORTS

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PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

B. This Section includes Hangers and Supports for Mechanical Systems Piping and Equipment.

PART II - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Hangers: Galvanized carbon steel, adjustable, clevis.

B. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. Shield for Insulated Piping 2 Inches and Smaller: 18 gage galvanized steel shield over insulation in 180 degree segments, minimum 12 inches long at pipe support.

2.2 HANGER RODS

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

2.3 FLASHING

A. Metal Flashing: 26 gage galvanized steel.

B. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

2.4 SLEEVES

A. Sleeves for Pipes: Form with schedule 40, galvanized steel pipe

B. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated sleeves including seals, UL listed.

C. Sleeves for Round Ductwork: Form with galvanized steel.

D. Sleeves for Rectangular Ductwork: Form with galvanized steel or wood.

E. Fire Stopping Insulation: Glass fiber type, non-combustible.

F. Caulk: Fire Barrier type sealant.

2.5 MISCELLANEOUS MATERIALS

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

B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts.

C. Washers: ASTM F 844, steel, plain, flat washers.

2.6 ATTACHMENTS

A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used. Permitted in concrete over 4 inches thick.

B. Beam Clamps: Types 20, 21, 28 or 29

C. Wood: Wood screws or lag bolts

PART III - EXECUTION

3.1 HANGERS AND SUPPORTS INSTALLATION

A. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Install building attachments within concrete or to structural steel. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping.

C. Install hangers and support complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

D. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

E. Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

F. Support horizontal piping as follows:

PIPE SIZE	HANGER SPACING	MAXIMUM HANGER DIAMETER
1/2 to 1-1/4 inch	6' - 6"	3/8"
1-1/2 to 2 inch	10' - 0"	3/8"

G. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.

H. Place a hanger within 12 inches of each horizontal elbow.

I. Use hangers with 1½ inch minimum vertical adjustment.

J. Support vertical piping at every floor.

L. Support riser piping independently of connected horizontal piping.

M. All pipe hangers shall be galvanized steel or copper.

N. Pipe strapping, duct tape or zip ties will not be allowed.

3.2 EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of concrete.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural steel stands to suspend equipment from structure above or support equipment above floor.

B. Grouting: Place grout under supports for equipment, and make a smooth bearing surface.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for pipe and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for manual shielded metal arc welding, appearance and quality of welds.

3.5 FLASHING

A. Provide flexible flashing and metal counter-flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Provide curbs for mechanical roof installations 14 inches minimum high above roofing surface. Flexible sheet flash and counter-flash with sheet metal; seal watertight.

3.6 SLEEVES

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Design hangers without disengagement of supported pipe.

C. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with fire stopping insulation and caulk seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

D. Install chrome plated steel or stainless steel escutcheons at finished surfaces.

END OF SECTION 15501

SECTION 15504 - PIPING INSULATION-REFRIGERANT/CONDENSATE

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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 50or less.
2. Exterior Insulation: Flame spread rating of 75 or less and a smoke developed rating of 150 or less.

1.4 SEQUENCING AND SCHEDULING

A. Schedule insulation application after testing of piping systems.

B. Schedule insulation application after installation and testing of heat trace tape.

PART II - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers

1. Flexible Elastomeric Cellular:
   a. Armstrong World Industries, Inc.
   b. Halstead Industrial Products
   c. IMCOA
   d. Rubatex Corporation

2.3 FLEXIBLE ELASTOMERIC CELLULAR

A. Material: Flexible expanded closed-cell structure with smooth skin on both sides.

B. Form: Tubular materials conforming to ASTM C 534, Type I.

C. Thermal Conductivity: 0.30 average maximum at 75 degrees F.

D. Coating: Water based latex enamel coating recommended by insulation manufacturer.

2.5 ADHESIVES

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

2.8 SEALING COMPOUNDS

B. Weatherproof Sealant: Flexible elastomer based, vapor barrier sealant designed to seal metal joints.

1. Water Vapor Permeance: 0.02 perm maximum

2. Temperature Range: Minus 50 to 250 degrees F

PART III - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION - GENERAL

A. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.

B. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.

C. Keep insulation materials dry during application and finishing.

D. Apply insulation continuously over fittings, valves, and specialties.

E. Apply insulation with a minimum number of joints.

F. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.

G. Fire-Rated Walls and Partitions Penetrations: Terminate insulation at penetrations through fire rated walls and partitions. Seal insulation ends with vapor barrier coating. Seal around penetration with fire stopping or fire resistant joint sealer.

H. Flanges, Fittings, and Valves: Apply pre-molded, pre-cut, or field fabricated segments of insulation around flanges, unions, valves, and fittings. Make joints tight. Bond with adhesive.

1. Use same material and thickness as adjacent pipe insulation.

2. Overlap nesting insulation by 2 inches or 1-pipe diameter, whichever is greater.

3. Apply materials with adhesive, fill voids with mineral fiber insulating cement. Secure with wire or tape.

4. Insulate elbows and tees smaller than 3-inches pipe size with pre-molded insulation.

5. Insulate elbows and tees Three (3) inches and larger with pre-molded insulation or insulation material segments. Use at least 3 segments for each elbow.

J. Hangers and Anchors: Apply insulation continuously through hangers and around anchor attachments. Install saddles, shields, and inserts as specified.

1. Inserts and Shields: Cover hanger inserts and shields with jacket material matching adjacent pipe insulation.

3.4 FLEXIBLE ELASTOMERIC CELLULAR INSULATION INSTALLATION

A. Slip insulation on the pipe before making connections wherever possible. Seal joints with adhesive. Where the slip-on technique is not possible, cut one side longitudinally and apply to the pipe. Seal seams and joints with adhesive.

B. Valves, Fittings, and Flanges: Cut insulation segments from pipe or sheet insulation. Bond to valve, fitting, and flange and seal joints with adhesive.

1. Miter cut materials to cover soldered elbows and tees.

2. Fabricate sleeve fitting covers from flexible elastomeric cellular insulation for screwed valves, fittings, and specialties. Miter cut materials. Overlap adjoining pipe insulation.

3.6 FINISHES

A. Flexible Elastomeric Cellular Insulation: After adhesive has fully cured, apply 2 coats of protective coating to exposed insulation. Paint all exterior insulation with UV resistant paint as recommended by Insulation manufacturer.

INTERIOR COLD CONDENSATE DRAINS

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

REFRIGERANT SUCTION

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

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

2.2 INSTALLATION

A. GLASS FIBER

1. Material: Inorganic glass fibers, bonded with a thermosetting resin.

B. Jacket: All purpose, factory-applied, laminated glass fiber reinforced, flame retardant Kraft paper and aluminum foil having self-sealing lap.

C. Blanket: ASTM C 553, Type II, Class F-1, jacketed flexible blankets-2" thick.

1. Thermal Conductivity: 0.32 average maximum, at 75 degrees F mean temperature.

D. Adhesive: Produced under the UL Classification and follow-up service.

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

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2.3 ACCESSORIES AND ATTACHMENTS

A. Corner Angles: 28-gauge, 1inch by 1-inch aluminum, adhered to 2-inch by 2-inch Kraft paper.

B. Anchor Pins: Capable of supporting 20 pounds each. Provide anchor pins and speed washers of sizes and diameters as recommended by the manufacturer for insulation type and thickness.

2.4 SEALING COMPOUNDS

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

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

PART III - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

A. Select accessories compatible with materials suitable for the service. Select accessories that do not corrode, soften, or otherwise attack the insulation or jacket in either the wet or dry state.

B. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.

C. Install insulation with smooth, straight, and even surfaces.

D. Seal joints and seams to maintain vapor barrier.

E. Seal penetrations for hangers, supports, anchors and other projections.

F. Keep insulation materials dry during application and finishing.

H. Blanket Insulation: Install tight and smooth. Secure to ducts having long sides or diameters as follows:

1. Smaller Than 24 Inches: Bonding adhesive applied in 6-inch wide transverse strips on 12-inch centers.
2. Twenty-four (24) Inches and Larger: Anchor pins spaced 12 inches apart each way. Apply bonding adhesive to prevent sagging of the insulation.
3. Overlap joints three (3) inches.
4. Seal joints, breaks, and punctures with vapor barrier compound.

END OF SECTION 15507

SECTION 15513 – REFRIGERANT PIPING

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PART I - GENERAL

1.1 A. This section includes all pipe, pipe fittings, hangers, supports, etc. as may be required to provide a complete refrigerant piping system.

B. Testing of all piping shall be made in the presence of a designated representative of the owner. No piping shall be covered or put into operation before such testing has been approved.

C. The actual arrangement of the piping shall follow the general locations shown on the drawings such that clearances, line drainage, etc. shall be maintained.

PART II - PRODUCTS

2.1 PIPING

A. Refrigerant piping shall be type "ACR" hard drawn copper conforming to ANSI B-31.5 or ASTM B280.

2.2 PIPE FITTINGS

A. Copper pipe fittings shall be wrought metal solder joint type conforming to ANSI B16.22.

PART III - EXECUTION

3.1 PIPING

A. The installation of piping and related items shall be made neatly and in such a manner as not to interfere with access to valves or equipment.

B. All piping shall be reamed to remove all burrs, fins and foreign material. Pipe shall be thoroughly cleaned before soldering.

C. "Sil-Fos" or silver solder shall be used with non-corrosive flux. During the soldering operation, the pipe shall be purged with nitrogen.

D. Piping shall be arranged (and traps installed where necessary) to allow the proper return of oil to the compressor.

3.2 HANGERS AND SUPPORTS

A. The spacing of hangers and supports shall not exceed five feet.

B. Pipe covering protection saddles shall be used at all supports for insulated piping. Sheet metal shields shall be 10 gauge, one half the circumference of the insulation and minimum of twelve inches long.

3.3 TESTING

A All refrigerant equipment not tested at the factory shall be shut off from the rest of the system and tested. Piping systems shall be tested after installation is complete and before any insulation is applied. All controls and other apparatus that may be damaged by the test pressure shall be removed before tests are made.

B. Refrigerant lines shall be tested at 150 psig with dry nitrogen. Pressure shall be maintained for 60 minutes without loss of pressure. Each joint shall be checked for leaks with a soap solution. Testing and repair shall continue until there is no loss of pressure. After a satisfactory pressure test, high vacuum pumps shall be connected to the system and the system evacuated to a pressure of 0.20 inches of mercury with the ambient temperature at not less than 36 degrees F. After this has been attained, the vacuum shall be broken by charging the system with refrigerant as soon as possible.

END OF SECTION 15055

SECTION 15672 - SPLIT SYSTEM HEAT PUMP

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PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes Split System Heat Pumps.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed, and operating), dimensions, required clearances, and methods of assembly of components, furnished specialties and accessories and installation and start-up instructions.

B. Wiring Diagrams: Submit ladder-type wiring diagrams for power and control wiring required for final installation of heat pump units and controls. Clearly differentiate between portions of wiring which are factory-installed and portions to be field-installed.

C. Operation and Maintenance Data: Submit maintenance data and parts list for each heat pump unit, control, and accessory; including "trouble shooting" maintenance guide; plus servicing, and preventative maintenance procedures and schedule. Include this data and product data in maintenance manual in accordance with requirements of Division 1.

1.4 WARRANTY

A. Provide Five (5) Year Warranty.

B. Warranty: Include coverage for Refrigerant Compressors.

PART II - PRODUCTS

2.1 SPLIT SYSTEM HEAT PUMPS

A. Acceptable Manufacturers:

1. Carrier Air Conditioning: Division of Carrier Corp.
2. Trane (The) Co.: Division of American Standard Inc.
3. York: Division of York International

2.2 GENERAL

A. Spilt System: The split-system unit shall be an outdoor heat pump unit and indoor factory-fabricated single-zone draw-through air-handling unit. Both indoor and outdoor unit shall be by the same manufacturer. The net capacities shall be as indicated and shall not exceeded by more than 5%. The minimum efficiency for systems less than 65,000 BTUH shall be 15.0 SEER. The minimum efficiency for systems of 65,000 BTUH or greater shall be in accordance with the 2012 N. C. State Building Code: Energy Conservation Code.

2.3 AIR HANDLER

A. Direct Expansion Coil: Coil shall be provided with pressure-type brass distributors and solder connections. The coil shall be dehydrated after testing and charged with dry air. Maximum working conditions shall be 300 psig at 200 degrees F for cooling. Tests shall be conducted, subjecting the coil to a minimum air pressure of 350 psig with the coil submerged in water. The cooling coil shall be subject to ASHRAE 15-1978 Safety code for Mechanical Refrigeration. Coils shall be of the cartridge type, removable from other side of casing and supported the entire length in tracks. Staggered tube pattern shall be provided for all coils of more than one row deep. Tubing shall have a minimum outside diameter of 1/2 inch. Tubing shall be individually finned with smooth aluminum or copper fins, wound under tension. Tube joints for all coils shall be made with high temperature brazing alloys.

B. Cabinet: Unit shall be provided with baked enamel finish and internally insulated. Fan shall be forward curved, and dynamically and statically balanced at the factory. Fan shall be belt driven. Provide adjustable sheaves for each air handler. Fan and motor bearings shall be permanently lubricated type.

2.4 OUTDOOR HEAT PUMP UNIT

A. Unit shall be factory-assembled and tested. Unit shall provide liquid lift as required to suit installation. Unit shall deliver the specified capacity to the cooling coil with an ambient air temperature of 95 degrees F. Units shall be certified per ARI 240 and 270.

B. Coil shall have aluminum plate fins, mechanically bonded to ½ inch aluminum tubes. Coil shall be circuited for sub-cooling.

C. Outdoor Fans and Motors: Unit shall be furnished with direct-driven, propeller-type fans arranged for vertical discharge. Condenser fan motors shall have Class B motor insulation and built in current and thermal overload protection, and shall be of the permanently lubricated type, resiliently mounted. Each fan shall have a safety guard.

D. Compressor: Unit shall have compressors of serviceable hermetic design with external spring isolators and an automatically reversible oil pump. Compressor motors shall have across-the-line start.

E. Controls shall be factory-wired and located in a separate enclosure. Safety devices shall consist of high and low pressure stats and compressor overload devices. Unit wiring shall incorporate a time delay relay to prevent short-cycling of the compressor. Relay shall prevent compressor from restarting for a 5-minute period. The unit shall include a transformer for 24-volt control circuit, pressure relief valves and circuit breakers.

F. Casing shall make unit fully weatherproof for outdoor installation. Casing shall be of galvanized steel, zinc phosphatized and finished with baked enamel. Openings shall be provided for power and refrigerant connections. Panel shall be removable to provide access for servicing. The unit shall be mounted on manufacturer's standard legs anchored to concrete pedestals with steel bearing plates and neoprene pads.

G. Connections: Only one liquid line, one suction line, required for units under 15 tons in capacity shall be provided. A 15-ton unit shall be dual circuited. Double suction risers for the refrigerant lines shall be provided.

H. Piping shall be sized by the manufacturer.

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2.5 TEMPERATURE CONTROL SYSTEM

A. See Section 15973, Direct Digital Controls

2.6 FILTRATION

A. Provide a filter rack and a 1" replaceable pleated throwaway filter. Filter rack size shall be as required by AHU manufacture.

B. Provide additional sets of filters (minimum of 3) as required during construction. Install a clean set of filters for the Final Inspection.

PART III - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide for connection to electrical service.

C. Install units with vibration isolation.

D. Install units on concrete base as indicated.

3.2 MANUFACTURER'S FIELD SERVICES

A. Prepare start systems under provisions of Section 15500.

B. Provide initial start-up.

C. Supply initial charge of refrigerant and oil for each refrigerant circuit. Replace losses of refrigerant and oil.

END OF SECTION 15672

SECTION 15674 DUCT FREE SPLIT SYSTEM AIR CONDITIONER

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PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed, and operating), dimensions, required clearances, and methods of assembly of components, furnished specialties and accessories and installation and start-up instructions.

B. Wiring Diagrams: Submit ladder-type wiring diagrams for power and control wiring required for final installation of heat pump units and controls. Clearly differentiate between portions of wiring which are factory-installed and portions to be field-installed.

C. Operation and Maintenance Data: Submit maintenance data and parts list for each heat pump unit, control, and accessory; including "trouble shooting" maintenance guide; plus servicing, and preventative maintenance procedures and schedule. Include this data and product data in maintenance manual in accordance with requirements of Division 1.

1.3 WARRANTY

A. Provide Five (5) Year Warranty.

B. Warranty: Include coverage for Refrigerant Compressors.

PART II - PRODUCTS

2.1 SPLIT SYSTEM AIR CONDITIONER

A. Acceptable Manufacturers:

1. Mitsubishi
2. Sanyo.
3. Freidrich
4. Amana

2.2 GENERAL

A. Spilt System: The split-system unit shall be an outdoor condensing unit and indoor factory-fabricated single-zone draw-through air-handling unit. Both indoor and outdoor unit shall be by the same manufacturer. The net capacities shall be as indicated and shall not be exceeded by more than 5%. The minimum efficiency for systems less than 65,000 BTUH shall be 13.0 SEER and shall be in accordance with the 2012 N. C. State Building Code: Energy Conservation Code.

2.3 AIR HANDLER

A. Direct Expansion Coil: Coil shall be provided with pressure-type brass distributors and solder connections. The coil shall be dehydrated after testing and charged with dry air. Maximum working conditions shall be 300 psig at 200 degrees F for cooling. Tests shall

be conducted, subjecting the coil to a minimum air pressure of 350 psig with the coil submerged in water. The cooling coil shall be subject to ASHRAE 15-1978 Safety code for Mechanical Refrigeration. Staggered tube pattern shall be provided for all coils of more than one row deep. Tubing shall have a minimum outside diameter of 1/2 inch. Tubing shall be individually finned with smooth aluminum or copper fins, wound under tension. Tube joints for all coils shall be made with high temperature brazing alloys.

B. Cabinet: Unit shall be provided with baked enamel finish and internally insulated. Fan shall be forward curved, and dynamically and statically balanced at the factory. Fan and motor bearings shall be permanently lubricated type.

2.4 OUTDOOR CONDENSING UNIT

A. Unit shall be factory-assembled and tested. Unit shall provide liquid lift as required to suit installation. Unit shall deliver the specified capacity to the cooling coil with an ambient air temperature of 95 degrees F. Units shall be certified per ARI 240 and 270.

B. Coil shall have aluminum plate fins, mechanically bonded to ½ inch aluminum tubes. Coil shall be circuited for sub-cooling.

C. Outdoor Fans and Motors: Unit shall be furnished with direct-driven, propeller-type fans arranged for vertical discharge. Condenser fan motors shall have Class B motor insulation and built in current and thermal overload protection, and shall be of the permanently lubricated type, resiliently mounted. Each fan shall have a safety guard.

D. Compressor: Unit shall have compressors of serviceable hermetic design with external spring isolators and an automatically reversible oil pump. Compressor motors shall have across-the-line start.

E. Controls shall be factory-wired and located in a separate enclosure. Safety devices shall consist of high and low pressure stats and compressor overload devices. Unit wiring shall incorporate a time delay relay to prevent short-cycling of the compressor. Relay shall prevent compressor from restarting for a 5-minute period. The unit shall include a transformer for 24-volt control circuit, AND pressure relief valve.

F. Casing shall make unit fully weatherproof for outdoor installation. Casing shall be of galvanized steel, zinc phosphatized and finished with baked enamel. Openings shall be provided for power and refrigerant connections. Panel shall be removable to provide access for servicing. The unit shall be mounted on manufacturer's standard legs anchored to concrete pedestals with steel bearing plates and neoprene pads.

G. Piping shall be sized by the manufacturer.

2.5 FILTRATION

A. Provide a throw away filter.

B. Provide additional sets of filters (minimum of 3) as required during construction. Install a clean set of filters for the Final Inspection.

PART III - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide for connection to electrical service.

C. Install units with vibration isolation.

D. Install units on concrete base as indicated.

3.2 MANUFACTURER'S FIELD SERVICES

A. Prepare start systems under provisions of Section 15500.

B. Provide initial start-up.

C. Supply initial charge of refrigerant and oil for each refrigerant circuit. Replace losses of refrigerant and oil.

END OF SECTION

SECTION 15782 –Energy Recovery Ventilator 359

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.

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PART III - EXECUTION

3.1 EXAMINATION

A. Verify that proper power supply is available.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Mount units on field built mounting frame. Install mounting frame level. Mounting frame shall be provided by the HVAC Contractor. Field Coordinate frame and installation required.

C. See structural drawings for design of mounting frame.

3.3 MANUFACTURER'S FIELD SERVICES

A. Provide initial start-up and standard maintenance during first year of operation, including routine service and check-out.

END OF SECTION 15782

SECTION 15870 - POWER VENTILATORS

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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

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PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes low pressure ducts and plenums for heating, ventilating, and air conditioning systems

PART II - PRODUCTS

2.1 MATERIALS

A. Steel Ducts: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of G-90 for each side in conformance with ASTM A90.

B. Insulated Flexible Ducts: Flexible duct wrapped with flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75 degrees F.

C. Fasteners: Rivets, bolts, or sheet metal screws

D. Sealant: Liquid non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.

E. Hanger Rod: Steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.2 LOW PRESSURE DUCTWORK

A. Fabricate and support in accordance with SMACNA Low Pressure Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gages, re-inforcing and sealing for operating pressures indicated.

B. No variation of duct configuration or sizes permitted except by written permission.

C. Construct T's, bends, and elbows with radius of not less than 1½ times width of duct on center line. Where not possible and where rectangular elbows are used, provide turning vanes.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

E. Connect flexible ducts to metal ducts with liquid adhesive.

F. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.

G. Use double nuts and lock washers on threaded rod supports.

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2.3 FACTORY FABRICATED DUCTWORK

A. Duct shall be of standard spiral lock seam or single-rib construction and shall be provided according to the gages given in the following table:

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:

Fitting Body Diameters (inches)	Minimum Round Fitting 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.

3.3 ADJUSTING AND CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that may be harmed by excessive dirt with temporary filters or bypass during cleaning.

B. Clean duct systems with high power vacuum machines. Protect equipment that may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

END OF SECTION 15891

SECTION 15910 - DUCT ACCESSORIES

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Not used
2. Turning Vanes
3. Duct Mounted Access Doors and Panels
4. Flexible Connectors
5. Flexible Ducts

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data including details for materials, dimensions of individual components, profiles, and finishes.

C. Shop drawings from manufacturer detailing assemblies: Include dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

PART II - PRODUCTS

2.3 AIR TURNING DEVICES

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

2.4 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.

B. Provide factory made spin-in starting collars for connections to trunk ducts.

2.5 DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards and as indicated.

B. Review locations prior to fabrication.

C. Fabricate rigid and close fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one-inch thick insulation with sheet metal cover.

D. Access doors smaller than 12 inches square may be secured with sash locks.

E. Provide two hinges and two sash locks for sizes up to 18 inches square, three hinges and two compression latches with outside and inside handles for sizes up to 24 x 48 inches. Provide an additional hinge for larger sizes.

F. Access doors with sheet metal screw fasteners are not acceptable.

PART III - EXECUTION

3.1 INSTALLATION

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

B. Provide balancing dampers at points on low pressure supply systems where branches are taken from larger ducts as required for air balancing. Use splitter dampers only where indicated.

C. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.

D. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.

E. Provide duct test holes where indicated and required for testing and balancing purposes.

END OF SECTION 15910

SECTION 15932 - AIR OUTLETS AND INLETS

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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

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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 ¾ inch maximum spacing with spring or other device to set blades, horizontal face, double deflection.

B. Fabricate 1¼ 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 ½ 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 ½ inch square mesh and factory prime coat baked enamel finish.

C. Mount unit on minimum 12-inch high curb base with insulation between duct and curb.

D. Make hood outlet area minimum of twice throat area.

PART III - EXECUTION

3.1 INSTALLATION

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

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry and lighting arrangement.

C. Install diffusers to ductwork with air-tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Paint ductwork visible behind air outlets and inlets matte black.

END OF SECTION 15932

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SECTION 15990 - TESTING, ADJUSTING AND BALANCING

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies the Requirements and Procedures of Total Mechanical Systems Testing, Adjusting and Balancing. Requirements include measurement and establishment of the fluid quantities of the Mechanical Systems as required to meet Design Specifications and Recording and reporting the results.

B. Testing and Balancing must be conducted by an independent, Certified Testing and Balancing firm, registered with either the AABC or the NEBB.

C. The Test and Balance Contractor shall be a subcontractor to the Mechanical Contractor.

1.3 SECTION INCLUDES

A. Testing, adjustment and balancing of air systems.

B. Measurement of final operating condition of HVAC Systems.

C. Sound measurement of equipment operating conditions.

D. Vibration measurement of equipment operating conditions.

1.4 SUBMITTALS

A. Submit under provisions of Section 15500.

B. Submit name of adjusting and balancing agency for approval within 30 days after Award of Contract.

C. Field Reports: Submit under provisions of Section 15500.

D. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

E. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.

F. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Owner and for inclusion in operating and maintenance manuals.

G. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Report shall reference the Contract Drawings for location of equipment and devices. Where reference to the contract drawings is not satisfactory, include a set of reduced drawings or sketches with equipment and devices identified to correspond with data sheets.

H. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.

I. Test Reports: Indicate data on AABC National Standards for Total System Balance forms or NEBB forms.

1.5 QUALITY ASSURANCE

A. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance, ASHRAE 111, and NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

B. Maintain one copy of each document on site.

1.6 SEQUENCING AND SCHEDULING

A. Sequence work under the provisions of Section 15500.

B. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

C. Schedule work under the provisions of Section 15500.

D. Schedule and provide assistance in final adjustment and test of Smoke Control System with Fire Authority.

PART II - PRODUCTS (Not Used)

PART III - EXECUTION

3.1 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:

1. Systems are started and operating in a safe and normal condition.

2. Control systems are installed complete and operable.

3. Proper thermal overload protection is in place for electrical equipment.

4. Ductwork Systems:

a. Final filters are clean and in place. If required, install temporary media in addition to final filters.
b. Duct systems are clean of debris.
c. Fans are rotating correctly.
d. Dampers are in place and open.
e. Air coil fins are cleaned and combed.
f. Access doors are closed and duct end caps are in place.
g. Air inlets and outlets are installed and connected.
h. Duct system leakage is minimized.

B. Submit Field Reports: Report defects and deficiencies noted during performance of services which prevent system balance.

C. Beginning of work means acceptance of existing conditions.

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3.2 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Owner to facilitate spot checks during testing.
B. Provide additional balancing devices as required.

3.3 INSTALLATION TOLERANCES

A. HVAC Systems: Adjust to within plus or minus 5 percent of design for supply and return systems and plus or minus 10 percent of design for exhaust systems.

B. Air Outlets and Inlets: Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.4 ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of balancing devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.5 AIR SYSTEM PROCEDURE

A. Adjust equipment and distribution systems to provide required or design air quantities.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure and record air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Adjust air volume by adjusting duct internal devices such as dampers and splitters. Do not utilize opposed blade dampers at air inlets and outlets.

F. Vary total system air quantities by adjusting sheave position at each fan. Vary branch air quantities by damper regulation.

G. Measure and record static air pressure conditions at air supply and exhaust units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

H. Adjust settings and minimum set points for motorized and back draft dampers to design conditions.

I. Measure and record inlet and outlet temperatures at each air supply unit at full cooling and heating capacity.

3.6 REPORT FORMS

A. Forms shall include the following:

1. Title Page:
   a. Name of Testing, Adjusting and Balancing Agency
   b. Address of Testing, Adjusting and Balancing Agency
   c. Telephone number of Testing, Adjusting and Balancing Agency
   d. Project Name
   e. Project Location
   f. Project Architect
   g. Project Engineer
   h. Project Contractor
   i. Project Altitude
   j. Report Date

2. Summary Comments:
   a. Design versus final performance
   b. Notable characteristics of system
   c. Description of systems operation sequence
   d. Summary of outdoor and exhaust flows to indicate amount of building pressurization
   e. Nomenclature used throughout report
   f. Test Conditions

3. Instrument List:
   a. Instrument
   b. Manufacturer
   c. Model Number
   d. Serial Number
   e. Range
   f. Calibration Date

4. Electric Motors:
   a. Manufacturer
   b. Model/Frame
   c. HP/BHP/Efficiency
   d. Phase, Voltage, Amperage; Nameplate, Actual, No Load
   e. RPM
   f. Service Factor
   g. Starter Size, Rating, Heater Elements
   h. Sheave Make/Size/Bore

5. V-Belt Drive:
   a. Identification/Location
   b. Required Driven RPM
   c. Driven Sheave, Diameter and RPM
   d. Belt, Size and Quantity
   e. Motor Sheave Diameter and RPM
   f. Center to center distance, maximum, minimum, and actual

6. Equipment Data:
   a. Identification/number
   b. Manufacturer
   c. Model number and Serial number

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d. Capacity
e. Service
f. Design flow rate, pressure drop, BHP

g. Actual flow rate, pressure drop, BHP
h. Temperature readings

7. Duct Traverse:
   a. System zone/branch
   b. Duct size
   c. Area
   d. Design velocity
   e. Design air flow
   f. Test velocity
   g. Test air flow
   h Duct static pressure
   i Air temperature
   j Correction factor

8. Air Distribution Test Sheet:
   a. Air terminal number
   b. Room number/location
   c. Terminal type
   d. Terminal size
   e. Area factor
   f. Design velocity
   g. Design air flow
   h. Test (final) velocity
   i Test (final) air flow
   j. Percent of design air flow

3.7 SOUND AND VIBRATION TESTING

A. Test and adjust Mechanical Systems for sound and vibration in accordance with the detailed instructions of the referenced Standards.

B. Sound Level Test and Report:
   1. Location
   2. Octave Bands - equipment off
   3. Octave Bands - equipment on

C. Vibration Test and Report:

   1. Location of Points:
      a. Fan bearing: drive end
      b. Fan bearing: opposite end
      c. Motor bearing: center (if applicable)
      d. Motor bearing: drive end
      e. Motor bearing: opposite end
      f. Casing: (bottom or top)
      g. Casing: (side)
      h. Duct after flexible connection: (discharge)
      i. Duct after flexible connection: (suction)

   2. Test Readings:
      a. Horizontal, velocity and displacement
      b. Vertical, velocity and displacement
      c. Axial, velocity and displacement

3. Normally acceptable readings, velocity and acceleration

4. Unusual conditions at time of test

5. Vibration source (if non-complying)

END OF SECTION 15990

DIVISION 16: ELECTRICAL

16010	Basic Electrical Requirements
16050	Basic Electrical Materials and Methods
16100	Raceways, Boxes and Cabinets
16120	Wires and Cables
16140	Wiring Devices
16190	Supporting Devices
16195	Electrical Identification
16452	Grounding
16470	Panel Boards
16476	Disconnects
16515	Interior Lighting

SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS 380

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.

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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.

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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.

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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

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PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes Raceways, Fittings, Boxes, Enclosures and Cabinets for Electrical Wiring.

PART II - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1

B. Intermediate Metal Conduit: ANSI C80.6

C. Electrical Metallic Tubing and Fittings: ANSI C80.3 with compression-type fittings.

D. Flexible Metal Conduit: Zinc coated steel

E. Liquid tight Flexible Metal Conduit: Flexible steel conduit with PVC jacket.

F. Fittings: NEMA FB 1, compatible with conduit/tubing materials.

G. Non-Metallic Rigid Conduit: Schedule 40 pvc as where shown on the drawings.

H. "MC" type cable.

2.2 OUTLET AND DEVICE BOXES

A. Sheet Metal Boxes: NEMA OS 1

B. Cast Metal Boxes: NEMA FB 1, type FD, cast alloy box with gasketed cover

2.3 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1.

B. Cast Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

C. Pull Boxes: Code gauge steel with screw type removable cover. NEMA rated for the condition.

PART III - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of the raceway system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 MINIMUM CONDUIT SIZE: (unless indicated otherwise) on the drawings conduit shall be sized as follows:

A. Indoors: The minimum conduit size shall be 1/2".

1. Flexible metal conduit may be used for tap connection to recessed lighting fixtures.

B. Outdoors: Branch circuit conduit installed below grade to exterior equipment shall be one (1) inch minimum unless noted otherwise.

3.3 WIRING METHODS: Unless noted otherwise on the drawings the following materials shall be used:

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid or intermediate metal conduit.

2. Underground: Galvanized Rigid Conduit.

3. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Liquid tight flexible metal conduit.

4. Boxes and Enclosures: NEMA Type 3R or Type 4.

B. Indoors: Use the following wiring methods:

1. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Flexible metal conduit, except in wet or damp locations use liquid tight flexible metal conduit.

2. Damp or Wet Locations: Rigid steel conduit.

3. Exposed: Electrical metallic tubing above 8 feet and rigid metallic conduit below eight (8) feet.

4. Concealed: Electrical metallic tubing or MC cable.

5. Boxes and Enclosures: NEMA Type 1, except in damp or wet locations use NEMA Type 3R, unless otherwise noted.

3.4 INSTALLATION

A. Telephone/Data/Cable TV outlet boxes shall be 2 gang with appropriate trim and cover. Coordinate cover plates with Owner.

B. Provide insulated bushings for all conduit ends.

C. Conceal rigid conduit and EMT, unless otherwise indicated, within finished walls, ceilings, above attic space and below floors.

D. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.

E. Install raceways level and square and at proper elevations. Provide adequate headroom.

F. Complete raceway installation before starting conductor installation.

G. Use temporary closures to prevent foreign matter from entering raceway.

H. Protect stubs from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

I. **Where non-metallic conduit is shown to be used below the slab provide rigid conduit to turn up into the building space or at all exterior walls, poles or equipment.**

J. Use raceway fittings compatible with raceway and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, except as otherwise indicated.

K. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions, except as otherwise indicated. Where the number of bends exceed the total number required by the N.E.C., provide pull boxes as required by code.

L. Install raceways parallel to or at right angles to surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports where practical.

2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where they can be installed parallel; otherwise, provide field bends for parallel raceways.

M. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Use bonding jumpers where joints cannot be made tight.

2. Use insulating bushings to protect conductors.

3. Provide expansion joint fittings where required for the raceway used.

N. IMC and GRC shall terminate with either a double locknut/bushing set or in a threaded hub.

O. Where conduit type "LB" fittings are used all conduits on conduits over 2" in size shall be "MOGAL" type.

P. "EMT" connectors shall be steel plated hexagonal compression type only. Do not use pot metal, set-screw, or indenter type connectors.

Q. Where concentric, eccentric, or oversized knockouts are encountered, a grounding-type insulated bushing shall be provided.

R. Where conduits of any type pass over a building expansion joint, a standard "expansion joint" fitting, compatible with the type raceway, shall be provided.

S. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.

T. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the

raceway so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

U. Install pull cords in all empty raceways. Use monofilament plastic line having not less than 200-lb (90 kg) tensile strength. Leave not less than 12 inches (300 mm) of slack at each end of the pull cord.

V. Telephone and Signal System Raceways 2 Inch Trade Size and Smaller: In addition to the above requirements, install in maximum lengths of 150 feet (45 m) and with a maximum of two 90-degree bends or equivalent. Install pull or junction boxes where necessary to comply with these requirements. Pull boxes shall be a minimum of 10" square x 6" deep with removable cover.

W. Install raceway sealing fittings at suitable, approved, accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points and elsewhere as indicated:

1. Where conduits enter or leave hazardous classified locations.

2. Where conduits pass from warm locations to cold locations, such as exterior spaces and air-conditioned spaces.

3. Where otherwise required by the NEC.

X. Stub-Up Connections: Extend conduits through concrete floor a minimum of 6" for connection to freestanding equipment. Extend conductors to equipment with flexible metal conduit. Where equipment connections are not made under this Contract verify the length of the flexible connectors.

Y. Flexible Connections: Use maximum of 6 feet (1830 mm) of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquid tight flexible conduit in wet or damp locations. Install separate ground conductor.

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

BB. All underground raceways shall be identified by "UNDERGROUND LINE MARKING TAPE" located directly above the raceway at 6" below finished grade. Tape shall be permanent, bright-colored, continuous, magnetic strip, printed, plastic tape compounded for direct burial not less than 6" wide and 4 mils thick. Printed legend shall be indicative of the service it is marking. Provide sufficient tape not less than 2/3 of the width of the item marked for the full length of the Raceway.

CC. Where underground raceways are required to turn up into cabinets, equipment, etc., and on to poles, the elbow required and the sub-up out of the slab or earth shall be rigid steel.

DD. Where shown to be used on the drawings PVC non-metallic conduit used exterior to the building for grouped circuits it shall be encased in a minimum of 3" of 3000 psi rated concrete. Concrete encased non-metallic ducts shall be supported on plastic separators coordinated with duct size and spacing. Separators shall be spaced close enough to prevent sagging and deforming of ducts. Secure separators to the earth and to ducts to prevent floating during placement of concrete. Do not use steel or tie wires in such a way to form conductive or magnetic loops around ducts or duct groups.

EE. The Raceway System shall not be relied on for grounding continuity. A green grounding conductor, properly sized per NEC Table 250-122, shall be run in all power raceways.

FF. Where non-metallic conduit is allowed on the drawings all bends and off-sets shall be made by approved mechanical benders per the manufacturers instruction. Any conduit not in compliance will be removed.

3.5 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, to ensure that coatings, finishes, and cabinets are without damage or deterioration at Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to paint finishes with matching touch-up coating recommended by the manufacturer.

3.6 CLEANING

A. Upon completion of installation of system, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt and construction debris and repair damaged finish, including chips.

END OF SECTION 16100

SECTION 16120 - WIRES AND CABLES

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PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes Building Wires and Cables and Associated Splices, Connectors and Terminations for Wiring Systems rated 600 Volts and Less.

PART II - PRODUCTS

2.1 BUILDING WIRES AND CABLES

A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3 "Applications" Article.

B. Rubber Insulation: Conform to NEMA WC 3.

C. Thermoplastic Insulation: Conform to NEMA WC 5.

D. Cross-Linked Polyethylene Insulation: Conform to NEMA WC 7.

E. Ethylene Propylene Rubber Insulation: Conform to NEMA WC 8.

F. Solid conductor for 10 AWG and smaller: Stranded conductor for larger than 10 AWG.

2.2 CONNECTORS AND SPLICES

A. UL-listed factory fabricated wiring connectors of size, ampacity rating, material, and type and class for application and for service indicated.

PART III - EXECUTION

3.1 EXAMINATION

A. Examine raceways and building finishes to receive wires and cables for compliance with installation tolerances and other conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Feeders and Branch Circuits: Type THHN\THWN or XHHW, copper conductor, in raceway.

3.3 INSTALLATION

A. All conductors shall be copper.

B. Minimum conductor size for power and lighting circuits shall be #12 AWG. Maximum conductor size shall be 500 KCMIL AWG.

C. All power and lighting circuits #10 awg and smaller shall be solid copper conductors. Conductor sizes #8 awg and larger shall be Class "B" stranded copper conductors.

D. Pull conductors into raceway simultaneously where more than one is being installed in same raceway.

1. Use pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation.

2. Use pulling means, including fish tape, cable, rope, and basket weave wire/cable grips that will not damage cables or raceway.

E. Conductor Splices: Keep to minimum.

F. Wiring at Outlets: Install with at least 8 inches of slack conductor at each outlet.

G. Connect outlets and components to wiring and to ground as indicated. Tighten to UL Standard 486A.

H. Power and Lighting circuits shall have individual neutral conductors.

I. All power circuits noted for computer equipment with isolated grounding shall be individually installed in a separate conduit with separate phase, neutral conductor, grounding conductor, and isolated grounding conductor, unless noted otherwise.

J. In no case shall any wire installed to a device exceed the U.L. rating of the device.

3.4 SPLICING

A. Joints in solid conductors shall be using Idea "wire nuts", 3M Company "scotch lock", or "T&B" "PIGGY" connectors in junction boxes, outlet boxes and lighting fixtures.

B. "Sta-kon" or other permanent type crimp connectors shall not be used for branch circuit connections.

C. Joints in stranded conductors shall be spliced by approved mechanical connectors. Solderless mechanical connectors similar to "NSI" multi-cable connector blocks for splices and taps, provided with UL approved insulating covers, may be used instead of mechanical connectors plus tape.

D. Conductors in all cases, shall be continuous from outlet to outlet unless "taps" are required and shall be made only within outlet, junction boxes, troughs and gutters.

3.5 VOLTAGE DROP

A. Where conductor length from the panel to the first outlet on a 120 volt circuit exceeds 100 feet, the branch circuit conductors from the panel to the first outlet shall be not smaller than #10 awg.

3.6 FIELD QUALITY CONTROL

A. Testing: Upon installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1.Procedures: Perform each Visual and Mechanical Inspection and Electrical Test stated in NETA Standard ATS, Section 7.3.1. Certify compliance with test parameters.

B. Correct malfunctioning products at site, where possible, and re-test to demonstrate

compliance; otherwise, remove and replace with new units and re-test.

3.7 ELECTRICAL TESTING

A. Feeder Insulation Resistance Testing:

1. All current carrying phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. This shall be done with a 500-volt megger. The procedures listed below shall be followed:

2. Minimum readings shall be one million (1,000,000) or more ohms for # 6 AWG wire and smaller, 250,000 ohms or more for #4 wire or larger, between conductor and the grounding conductor.

3. After all devices and equipment are installed and all connections completed to each panel, the Contractor shall disconnect the neutral feeder conductor from the neutral bar and take a megger reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the Contractor shall disconnect the branch circuit neutral wires from the neutral bar. Test each neutral conductor separately until the low readings are found. The Contractor shall correct troubles, reconnect and re-test until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.

4. The Contractor shall send a letter to the Engineer certifying that the above has been done and tabulating the megger readings for each panel. This shall be done at least four (4) days prior to final inspection.

5. At the final inspection, the Contractor shall furnish a megger and show the Engineers that the panels comply with the above requirements. He shall also furnish a hook-on type ammeter and a voltmeter and take current and voltage readings as directed by the representatives.

END OF SECTION 16120

SECTION 16140 - WIRING DEVICES

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PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes various types of receptacles, connectors, switches and finish plates.

1.3 SUBMITTALS

A. Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each product specified.

PART II - PRODUCTS

2.1 WIRING DEVICES

A. Comply with NEMA Standard WD 1-101968, "General Purpose Wiring Devices".

B. Enclosures: NEMA 1 equivalent, except as otherwise indicated.

C. Color: Selected by Architect.

D. Duplex receptacles shall be of the grounding type arranged for back and side wiring, with separate single or double grounding terminals. Receptacles shall be straight blade, rated 20 amp, 125 volt and the face configuration shall conform to the NEMA Standard No. WD-1, NEMA WD-6, DSCC W-C-596G & UL 498, and shall be approved third party listed. Self-grounding or automatic type grounding receptacles are not acceptable in lieu of receptacles with separate grounding screw lugs and a direct green insulated conductor connection to the equipment grounding system. Receptacles shall be specification grade mounted vertically.

E. Receptacles, Straight-Blade, Special Features: Comply with the basic requirements specified above for straight-blade receptacles of the class and type indicted, 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, panelboards, transformers, switchboards, switchboard branch breakers, motor control centers and other electrical equipment. Nameplates shall be securely attached with self-tapping stainless steel screws, if the screw end is protected; otherwise rivets shall be used. Letters shall be approximately ½" 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 406

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:

230/120 Volts	**Phase**
Black	A
Red	B
White	Neutral
Green	Ground

G. Use conductors with color factory-applied the entire length of the conductors except as follows:

1. The following field-applied color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.

   a. Apply colored, pressure-sensitive plastic tape in half- lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent possible unwinding. Use 1-inch wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration minimum width 2".

H. Tag or label conductors as follows:

1. Multiple Circuits: Where multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by mean of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at

terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.

2. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

I. Install equipment/system circuit/device identification as follows:

1. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with 1/2 inch high lettering on 1½ inch high label (2 inch high where two lines are required), white lettering in blue field for normal power equipment other face colors shall match the equipment served. Text shall match terminology and numbering of the Contract Documents and shop drawings.

2. All Phenolic labels shall be securely attached to the equipment by self-tapping stainless steel screws.

3. Name plate colors shall be as follows:

....Blue surface with white core for 120/230 Volt Equipment.

J. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panelboards and alarm/signal components, where labeling is specified elsewhere. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker. Pencil in all spare and leave spaces blank.

K. All outlet boxes, junction boxes and pull boxes shall have their covers and exterior visible surfaces painted with colors to match the surface color scheme specified. This includes covers on boxes above lay-in and other type accessible ceilings.

L. All empty conduit runs and conduit with conductors for future use shall be identified for use and shall indicate where they terminate. Identification shall be by pressure sensitive label applied to the conduit or outlet; designate "use" and "location served".

END OF SECTION 16195

SECTION 16452 - GROUNDING

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes Solid Grounding of Electrical Systems and Equipment. It includes basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other Sections of these Specifications.

1.3 QUALITY ASSURANCE

A. Listing and Labeling: Provide products specified in this Section that are listed and labeled. The terms "listed" and "labeled" shall be defined as they are in the National Electrical Code, Article 100.

PART II - PRODUCTS

2.1 GROUNDING AND BONDING PRODUCTS

A. Products: Of types indicated and of sizes and ratings to comply with NEC. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

B. Conductor Materials: Copper

2.2 WIRE AND CABLE CONDUCTORS

A. General: Comply with Division 16 Section "Wires and Cables". Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.

B. Equipment Grounding Conductor: Green insulated

C. Grounding Electrode Conductor: Stranded cable

D. Bare Copper Conductors: Conform to the following:

1.	Solid Conductors:	ASTM B-3
2.	Assembly of Stranded Conductors:	ASTM B-8
3.	Tinned Conductors:	ASTM B-33

2.3 MISCELLANEOUS CONDUCTORS

A. Ground Bus: Bare annealed copper bars of rectangular cross section, full-size rated.

B. Braided Bonding Jumpers: Copper tape, braided No. 30 gauge bare copper wire, terminated with copper ferrules.

C. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

2.4 CONNECTOR PRODUCTS

A. General: Listed and labeled as Grounding Connectors for the materials used.

B. Pressure Connectors: High conductivity-plated units

C. Bolted Clamps: Heavy-duty units listed for the application

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel with high strength steel core and electrolytic grade copper outer sheath, molten welded to core.

1. Size: 3/4 inch by 10 feet

PART III - EXECUTION

3.1 APPLICATION

A. Equipment Grounding Conductor Application: Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except where larger sizes or more conductors are indicated.

1. The raceway system shall not be relied on for ground continuity .Install an equipment ground conductor in all power related conduits. Size conductor as required by NEC Table 250-122. Data and Signal conduits do not require a separate grounding conductor unless required by the manufacturer of the equipment to be installed.

C. Signal and Communications: For telephone, alarm, and communication systems, provide a #6 AWG minimum green insulated copper conductor in raceway from the grounding electrode system to each terminal equipment location. Leave 3' pigtail wiring at termination point where equipment boards are shown. Make direct connection where equipment is provided.

3.2 INSTALLATION

A. General: Ground electrical systems and equipment in accordance with NEC requirements except where the Drawings or Specifications exceed NEC requirements.

B. The electrical service shall be grounded by three (3) means:

1. To the cold water main, if metallic and in direct contact with the earth for at least 10 feet as per the NEC Article 250-81.

2. To the steel frame of the building, provided the building frame is effectively grounded.

3. To ground rod(s)

C. Ground Rods: Locate a minimum of one-rod length from each other and at least the same distance from any other grounding electrode. Interconnect ground rods with bare conductors buried at least 24 inches below grade. Connect bare-cable ground conductors to ground rods by means of exothermic welds except as otherwise indicated. Make these connections without damaging the copper coating or exposing the steel. Use 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 torquing requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A and UL 486B.

D. Compression-Type Connections: Use hydraulic compression tools to provide the correct circumferential pressure for compression connectors. Use tools and dies recommended by the manufacturer of the connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the ground conductor.

3.4 FIELD QUALITY CONTROL

A. Tests: Subject the completed grounding system to a megger test at each location where a maximum ground resistance level is specified, at service disconnect enclosure ground terminal, and at ground test wells. Measure ground resistance without the soil being

moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the 2 point method in accordance with Section 9.03 of IEEE 81, "Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System".

B. Service Grounding Test

1. After completion of the electrical grounding and bonding systems, test the ground resistance with a ground resistance tester. Where test shown resistance-to-ground is over 25 ohms, provide additional ground rods until the minimum of 25 ohms is achieved.

C. Deficiencies: Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values. Where measures are detected that exceed those indicated the provisions of the Contract, covering changes will apply.

D. Report: Prepare test reports of the ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

3.5 CLEANING AND ADJUSTING

A. Restore surface features at areas disturbed by excavation and re-establish original grades. Where sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other Work to their original condition. Include necessary topsoil, fertilizing, liming, seeding, sodding, sprigging, or mulching.

END OF SECTION 16452

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SECTION 16470 – PANEL BOARDS

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes Lighting and Power Panel Boards and Associated Auxiliary Equipment Rated 600 V or Less

1.3 DEFINITIONS

A. Panel Boards: A panel board with thermal magnetic circuit-breaker branches, designed for residential and light commercial projects, operating at 600 V and below, available in both single and 3-phase versions, and equipped with combination flush/surface mounting trim.

B. Over-current Protective Device (OCPD): A device operative on excessive current that causes and maintains the interruption of power in the circuit it protects.

1.4 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data for each type panel board, accessory item, and component specified.

C. Shop Drawings from manufacturers of panel boards including dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features and voltage rating.

D. Include the following:

1. Enclosure type with details for types other than NEMA Type 1.
2. Bus configuration and current ratings.
3. Short-circuit current rating of panelboard.
4. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.

1.5 QUALITY ASSURANCE

A. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The terms "listed" and "labeled" shall be defined as they are in the National Electrical Code, Article 100.

B. Electrical Component Standard: Components and installation shall comply with NFPA 70, "National Electrical Code".

C. NEMA Standard: Comply with NEMA PB1, "Panel Boards".

D. UL Standards: Comply with UL 61, "Panel Boards", and UL 50, "Cabinets and Boxes".

PART II - PRODUCTS 413

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 indicted. 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

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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 nonteasible, positive, quick make-quick-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

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PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes interior lighting fixtures, lamps, ballasts, emergency lighting units, and accessories.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data describing fixtures, lamps, ballasts, and emergency lighting units. Arrange product data for fixtures in order of fixture designation. Include data on features and accessories and the following information:

1. Outline drawings of fixtures indicating dimensions and principal features.

2. Electrical ratings and photometric data with specified lamps and certified results of independent laboratory tests.

3. Data on batteries and chargers of emergency lighting units.

4. Shop Drawings from manufacturers detailing non-standard fixtures and indicating dimensions, weights, methods of field assembly, components, features and accessories.

5. Non-returnable samples, when requested by Engineer, for verification purposes of specific individual fixtures.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Listing and Labeling: Provide fixtures that are listed and labeled for their indicated use on the Project.

C. Coordination of Fixtures With Ceiling: Coordinate fixtures mounting hardware and trim with the ceiling system. Provide plaster or sheet-rock trims when required on the project whether indicated or not at no additional cost to the Owner. Coordinate with Architectural Plans before ordering fixtures.

1.5 WARRANTY

A. Minimum warranty period on emergency lights shall be three (3) years from date acceptance. Warranty shall include all parts (less lamps).

B. All other lighting products shall be warranted for a period of not less than 1 year from date of acceptance. This warranty does not include miscellaneous parts which are external to the product (i.e. lamps) which are considered maintenance item.

PART II - PRODUCTS

2.1 FIXTURES - GENERAL

A. Comply with the requirements specified in the Articles below and the Lighting Fixture Schedule on the Drawings.

2.2 FIXTURE COMPONENTS - GENERAL

A. Metal Parts: Free from burrs and sharp corners and edges.

B. Sheet Metal Components: Steel, except as indicated. Components are formed and supported to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating and free from light leakage under operating conditions. Arrange to permit re-lamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during re-lamping and when secured in the operating position. Light seal strips inside the fixture will not be allowed.

D. Reflecting Surfaces: Minimum reflectances as follows, except as otherwise indicated:

1.	White Surfaces:	85 percent
2.	Specular Surfaces:	83 percent
3.	Diffusing Specular Surfaces:	75 percent
4.	Laminated Silver Metalized Film:	90 percent

E. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic

1. Plastic: Highly resistance to yellowing and other changes due to aging, exposure to heat and UV radiation.

2. Lens Thickness: 0.125 inches minimum

2.3 SUSPENDED FIXTURE SUPPORT COMPONENTS

A. Single-Stem Hangers: ½ inch steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture.

B. Twin-Stem Hangers: Two, ½ inch steel tubes with single canopy arranged to mount a single fixture. Finish same as fixture.

C. Rod Hangers: 3/16 inch diameter cadmium plated, threaded steel rod.

2.4 FLUORESCENT FIXTURES

A. Electronic Ballast:

1. Ballast to be "UL listed, Class P".

2. Ballast to be "Sound Rated A".

3. Ballast enclosure size shall be same as or smaller than, magnetic ballast.

4. Light regulation shall be +/- 10% input voltage variation.

5. Ballast shall have high power factor (minimum of 90%).

6. Lamp current crest factor shall be equal to, or less than, 1.7.

7. Input current third harmonics shall not exceed ANSI recommendations (32% total harmonic distortion, 27.5% of the third triplets).

8. Flicker shall be 15% or less with any lamp suitable for the ballast.

9. Ballast design shall withstand line transients per IEEE 587, Category A.

10. Ballast case temperature shall not exceed 25 degrees C rise over 40 degrees C ambient.

11. Ballast shall meet FCC Rules and Regulations, Part 18.

12. Parallel wiring between the ballast and fixture is recommended.

13. Minimum of five (5) years warranty is required with each electronic ballast.

14. The manufacturer shall have not less than 5 years of experience in manufacturing electronic ballast.

B. Provide disconnecting means per NEC 410.130 G.

C. Low Temperature Ballast Minimum Starting Temperature: Minus 20 degrees C

D. Where compact fluorescent light fixtures are specified, "High Power Factor" electronic ballast shall be standard.

2.5 FLUORESCENT LAMPS

A. All fluorescent lamps to be {41} K-rated unless noted otherwise.

2.6 EXIT SIGNS

A. Conform to UL 924, "Emergency Lighting and Power Equipment".

1. Arrows: Include as indicated.

B. Emergency Exit Signs shall be of the "LED" style.

C. Units shall be completely self-contained, provided with maintenance-free battery, automatic charger, and other features. Luminaire must be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, NC Building Code, Volume X Energy code, NFPA-101, and NEMA Standards.

D. BATTERY-It shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Must have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of 0 degree C to 60 degrees C and contain a resealable pressure vent, a sintered + positive and – negative terminal.

E. CHARGER- It shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80%. A low voltage disconnect switch shall be included if LEAD

battery is used to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.

F. ADDITIONAL FEATURES- Pilot light to indicate the unit is connected to AC power. The battery shall have rate discharge pilot light, unless self-diagnostic type. Test switch to simulate the operation of the unit upon loss of AC power by energizing the lamps from the battery. This simulation must also exercise the transfer relay.

G. WARRANTY-The entire unit shall be warranted for 3 years. The battery must have an additional 2 more years pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.

H. LED-The use of LED is required due to their reliable performance, low power consumption, and limited maintenance requirements. Maximum LED failure rate shall be 25% within a seven (7) year period; otherwise, if exceeded, manufacturer shall replace the complete unit at no charge to the owner.

2.7 EMERGENCY LIGHTING UNITS

A. Conform to UL 924, "Emergency Lighting and Power Equipment" requirements for "Unit Equipment". Provide self-contained units with the following features and additional characteristics as indicated.

B. Units shall be completely self-contained, provided with maintenance-free battery, automatic charger, and other features. Luminaire must be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, NC Building Code, Volume X Energy code, NFPA-101, and NEMA Standards.

C. BATTERY-It shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Must have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of 0 degree C to 60 degrees C and contain a resealable pressure vent, a sintered + positive and – negative terminal.

D. CHARGER- It shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80%. A low voltage disconnect switch shall be included if LEAD battery is used to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.

E. ADDITIONAL FEATURES- Pilot light to indicate the unit is connected to AC power. The battery shall have rate discharge pilot light, unless self-diagnostic type. Test switch to simulate the operation of the unit upon loss of AC power by energizing the lamps from the battery. This simulation must also exercise the transfer relay.

F WARRANTY-The entire unit shall be warranted for 3 years. The battery must have an additional 2 more years pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.

2.8 FINISH

A. Steel Parts: Manufacturer's standard finish applied over corrosion-resistant primer, free of streaks, runs, holidays, stains, blisters, and defects. Remove fixtures showing evidence of corrosion during project warranty period and replace with new fixtures.

B. Paint parts after fabrication.

PART III – EXECUTION

3.1 INSTALLATION

A. Setting and Securing: Set units plumb, square, and level with ceiling and walls, and secure according to manufacturer's printed instructions and approved Shop Drawings.

B. Support For Recessed and Semi-Recessed Fixtures: Units shall be supported independent from suspended ceiling. Install fixture with support wires at 2 diagonal corners to the structure or building steel.

1. Fixtures of Sizes Less Than Ceiling Grid: Center in the acoustical panel. Support fixtures independently with at least two ¾ 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. 422

END OF SECTION 16515

US 23/74 REST AREA WATER AND SEWER SYSTEM IMPROVEMENTS

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

HAYWOOD COUNTY, NORTH CAROLINA

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SECTION 02730 SANITARY SEWER FORCE MAIN AND VALVES

PART 1: GENERAL

1.01 DESCRIPTION

Provide sanitary sewers suitable for transporting sewage. Refer to Divisions 10 and 15 of the North Carolina Department of Transportation (NCDOT) 2012 Standard Specifications.

1.02 MATERIALS

Refer to Division 10 of the NCDOT 2012 Standard Specifications fo r materials, except as other specified in this Section.

Use ductile iron fittings on 3" PVC pressurized force main pipelines.

Use #12 AWG solid-copper wire with green insulation for utility locator wires.

Use 2" plastic marking tape colored green with "Caution Sewer Line", or similar wording, permanently printed at 36" centers.

Valves for sanitary sewer force mains shall be as specified in this Section.

1.03 SCOPE OF WORK

A. All sanitary sewer force main excavation, bedding, pipe laying, jointing and coupling of pipe joints and backfilling shall be completed as described in Divisions 10 and 15 of the North Carolina Department of Transportation (NCDOT) 2012 Standard Specifications. .

1.04 DELIVERY, STORAGE AND HANDLING

A. PVC pipe shall be protected from sunlight when being stored. All materials shall be delivered, stored and handled in strict accordance with the manufacturer's recommendations.

PART 2: PRODUCTS

2.01 MATERIALS

A. Pipe:
Provide sanitary sewer pipe suitable for transporting sewage as specified in Divisions 10 and 15 of the NCDOT 2012 Standard Specifications.

1. Polyvinyl Chloride Sewer Pipe (PVC):

   a. All polyvinyl chloride pipe joints shall be of an integral bell and spigot of the same material as the pipe. It shall have a solid cross-section with rubber "0" ring securely locked in place at the point of manufacture.

   b. Force Main: Polyvinyl chloride pipe shall be as manufactured in accordance with ASTM D-2241, latest edition, and shall be suitable for use as a sanitary sewer force main pipe. The standard dimension ratio (SDR) for 3" diameter and smaller pipe shall be 13.5 unless otherwise noted on the contract drawings. PVC force main piping shall have a green exterior color. Under no circumstances shall pipe with a blue exterior color be accepted.

   c. Where PVC pipe is installed in iron pipe size (IPS), an IPS gasket shall be furnished with each fitting to ensure compatibility.

2. Fittings: Whenever the PVC sanitary sewer force main has a significant change in alignment or grade it will be necessary to furnish and install a fitting made of ductile iron.

   The specifications for the force main fittings are described below:

   a. Ductile Iron: All ductile iron fittings shall be mechanical joint manufactured in accordance with ANSI Specification A-21.1 and AWWA Standard C-110 for underground piping.

      The interior of the fittings shall be cement mortar lined and seal coated in accordance with ANSI Specification A21.4 and AWWA C-104.

B. Valves

1. Sewage Combination Air Relief Valves:

a. Provide air release valves where indicated on the drawings. The sewage combination air valve (SCAV), when required, shall be specifically designed for use in sewage applications. Its design shall prevent contact between the sewage and the sealing mechanism and shall ensure drip tight sealing. A spring cushioned joint between the sealing mechanism and the float/rod assembly shall perform without jamming or allowing air escape under vibrations or float bouncing related to the turbulence from pump starts and stops and/or flow fluctuations. Provide single body universal type with rolling seal system to seal both the pressure orifice and the air and vacuum orifice simultaneously.

b. The SCAV shall automatically discharge air and gas from a filling system, shall admit air into the system at drainage and at water column separation, and shall continuously release accumulated air and gas in a pressurized flowing system.

c. The Stainless steel or reinforced nylon valve body shall be conical in shape for assuring a larger air pocket while maintaining a short profile, assuring a larger chamber for non-restrictive movement of the float, and providing an outward slanting wall to deter accumulation of grease.

d. All springs, washers, and stems shall be constructed of ASTM 316 stainless steel.

e. All O-rings shall be made of BUNA-N with pressure ratings equivalent to the overall working pressure required for the SCAV.

f. The air release and sealing mechanism shall be constructed of reinforced nylon/Stainless Steel/EPDM.

g. Design valve to automatically exhaust large amounts of air and gases while the pipeline or system is being filled and close after the system is purged of air.

h. Design valve to re-open to admit air during draining or when a negative pressure exists in the system.

i. Provide valve with minimum 2" inlet, or larger, if shown on the drawings.

j. Design valve to allow minimum contact between operating mechanisms and sewage.

k. Provide internal linkage and float of stainless steel, polycarbonate, or polypropylene.

l. Provide all internals of 316 stainless steel or non-corrosive.

2. Plug Valves:

Plug valves shall be of the 1/4 turn, non-lubricated or permanently lubricated type. Plug valves shall have thru-port area equal to 100% of the line size. The valves shall be serviceable without moving the body from the pipeline and shall be capable of sealing rated pressure in either direction. The sealing arrangement shall be of the constant interference type with consistent opening torque and shall be non-binding in the closed position. The rubber thru-port seal shall be a full circle seat not penetrated by the valve shaft and shall be field replaceable on the existing vane. The hand lever operator shall have a position indicator that will hold the valve at 10° increments from open to close. The operator shall be capable of being locked at these positions. All valves shall be subjected to a 175 psi thru-port seal test and a 350 psi assembled valve hydrostatic test.

3. Valve Boxes: All underground valves shall be provided with valve boxes as detailed on the plans. All valve boxes shall be cast iron and shall conform to ASTM Specification A 48. Valve boxes shall be of the adjustable screw type with a base to fit the valve yoke with a removable cover with the word "sewer" cast thereon.

4. Manholes for Sewage Combination Air Relief Valves

a Precast concrete manhole cones or bottomless flat top slab manholes used to contain sewage combination air relief valves shall conform to the requirements of Division 10 and Division 15 of the NCDOT 2012 Standard Specifications.

PART 3: EXECUTION

3.01 CONSTRUCTION METHODS

1. Apply Section 1505 of the NCDOT 2012 Standard Specifications for excavation, trenching, pipe laying and backfill to sanitary sewer force main installation. Provide traffic control for lane and shoulder closures in accordance with all applicable NCDOT standards and requirements.

2. Refer to Section 1520 of the NCDOT 2012 Standard Specifications for other Construction Methods for sanitary sewer force main installation.

3. Refer to Section 1520 of the NCDOT 2012 Standard Specifications for testing of sanitary sewer force mains.

4. Install thrust restraint at all fittings in accordance with the details on the Drawings. Concrete for thrust blocks shall consist of a mix of Portland Cement, fine and coarse aggregate and water to produce concrete with a minimum compressive strength at 28 days of not less than 3000 psi when tested in accordance with ASTM Specifications C 39 or C 42.

5. Plug Valve and Valve Box:

   a. Before setting each valve, the Contractor shall make sure the interior is clean and shall test the valve for proper opening and closing. Valves shall be set with stems plumb, unless horizontal installation is called for on the drawings, and at the exact location(s) shown on the drawings.

   b. A standard type valve box shall be installed over each underground sanitary sewer force main valve. All valve boxes shall be set plumb with their top set flush with the finished grade.

   c. Trench backfill shall be properly compacted for a distance of 3'-0" on each side of the valve and valve box.

6. Sewage Combination Air Relief Valve:

a. A sanitary sewage combination air relief valve shall be installed at the locations shown on the contract drawings and the actual high points in the line.

b. A combination air relief valve installation, as shown in detail in the contract drawings, shall consist of the force main tap, air relief valve, precast concrete manhole sections, and standard heavy duty iron frame and cover.

7. Exposed Pipe:

a. Exposed pipe to be installed inside vaults and manholes shall be installed as shown on the Drawings and field painted as described below. All exposed ductile iron pipe shall utilize flanged joints unless otherwise noted.

b. All exposed cast or ductile iron pipe, fittings and valves shall be field painted with two (2) coats of epoxy paint as recommended by the paint manufacturer. Color of paint shall be as selected by the Owner.

PART 4 MEASUREMENT AND PAYMENT

A. *3" Force Main Sewer* will be measured and paid as described in paragraph 1520-4 of the NCDOT 2012 Standard Specifications.

B. *2" Air Release Valves and 3" Plug Valves* will be measured and paid per each as described in paragraph 1515-4 of the NCDOT 2012 Standard Specifications.

C. Payment will be made under:

Pay Item	Pay Unit
3" Force Main	Linear Foot
2" Air Release Valve	Each
3" Plug Valve	Each

END OF SECTION

SECTION 02731 1 1/2 INCH AND 3 INCH VALVES

PART 1: DESCRIPTION

Provide appropriate valves and water lines suitable for transporting and controlling potable water. Refer to Divisions 10 and 15 of the North Carolina Department of Transportation (NCDOT) 2012 Standard Specifications.

PART 2: MATERIALS

Refer to Division 10 of the NCDOT 2012 Standard Specifications for materials, except as other specified in this Section. Refer to Sections 1510 and 1515 of the NCDOT 2012 Standard Specifications. Valves for potable water lines shall be gate valves. Schedule 80 polyvinyl chloride (PVC) water line piping shall conform to ASTM D1784 and D1785, and NSF 61 for potable water use.

PART 3: CONSTRUCTION METHODS

Apply Section 1505 of the NCDOT 2012 Standard Specifications for excavation, trenching, pipe laying and backfill. Refer to Sections 1510 and 1515 of the NCDOT 2012 Standard Specifications for installation of water lines and valves.

PART 4 MEASUREMENT AND PAYMENT

A. *¾", 1 ½" and 3" Valves* will be measured and paid as described in paragraph 1515-4 of the NCDOT 2012 Standard Specifications. Schedule 80 PVC water lines will be measured and paid as described in paragraph 1510-4 of the NCDOT 2012 Standard Specifications.

B. Payment will be made under:

Pay Item	Pay Unit
¾" through 3" Valve	Each
¾" PVC Water Pipe, Sch 80	LF

END OF SECTION

SECTION 02736 FORCE MAIN FLUSHING CONNECTION

PART 1: GENERAL

1.01 SCOPE OF WORK

A. This section shall include all materials required to install the force main flushing connections shown and detailed in the Drawings. This item includes furnishing and installing all equipment, materials, labor and other appurtenances necessary for a complete and fully functional installation as described on the project drawings and as specified herein, including, but not limited to, precast concrete vault with access hatch, all piping, fittings and valves included inside the vault, the 3-inch plug valve and box located outside the vault, the piping and fittings needed to connect the flushing connection to the force main, and all other materials shown on the Drawings. All piping, valves and appurtenances shall be subject to approval by the Engineer and installed by the Contractor as designated on the plans in accordance with the installation specifications.

1.02 QUALITY ASSURANCE

A. The manufacturer shall have a minimum of ten (10) installations of similar materials and shall have at least five (5) years of experience in the manufacture of similar materials.

1.03 SUBMITTALS

A. Shop Drawings: The Contractor shall submit six (6) sets of shop drawings for review by the Engineer. The shop drawings shall include installation drawings, materials of construction, and catalogue cut sheets for all materials being supplied.

B. Operation and Maintenance Manuals: A minimum of three (3) copies of operation and maintenance manuals shall be submitted to the Engineer prior to start up.

1.04 DELIVERY, STORAGE AND HANDLING

A. No shipment shall be made until the equipment is approved by the Engineer. All equipment shall be properly protected so that no damage or deterioration shall occur during shipment or storage. All storage and

handling shall be in strict accordance with the manufacturer's recommendations.

1.05 WARRANTY

A. All equipment shall be warranted to be free from defects in workmanship, design and materials for a period of one (1) year. If any part of the equipment shall fail during the warranty period, it shall be repaired or replaced at no cost to the Owner.

PART 2: PRODUCTS

2.01 VALVES

A. Check Valves:

1. Check Valves Smaller Than 3": Swing check valves smaller than 3" shall be single disc with renewable bronze seat rings, bronze discs or disc rings and bronze disc hinges and pins and shall be designed to give a full diameter passage.

2. Check Valves 3" And Larger: Swing check valves 3" and larger shall be constructed with heavy cast-iron or cast-steel body with a bronze or stainless steel seat ring and a non-corrosive shaft for attachment of weight and lever. The valves shall absolutely prevent the return of water back through the valve when the inlet pressure decreases below the outlet pressure. The valve disc shall be of cast-iron or cast-steel and shall be suspended from a non-corrosive shaft.

B. Plug Valves: Plug valves shall be of the 1/4 turn, non-lubricated or permanently lubricated type. Plug valves shall have thru-port area equal to 100% of the line size. The valves shall be serviceable without moving the body from the pipeline and shall be capable of sealing rated pressure in either direction. The sealing arrangement shall be of the constant interference type with consistent opening torque and shall be non-binding in the closed position. The rubber thru-port seal shall be a full circle seat not penetrated by the valve shaft and shall be field replaceable on the existing vane. The hand lever operator shall have a position indicator that will hold the valve at 10° increments from open to close. The operator shall be capable of being locked at these positions. All valves shall be

subjected to a 175 psi thru-port seal test and a 350 psi assembled valve hydrostatic test.

C. Valve Boxes: All underground valves shall be provided with valve boxes as detailed on the plans. All valve boxes shall be cast iron and shall conform to ASTM Specification A 48. Valve boxes shall be of the adjustable screw type with a base to fit the valve yoke with a removable cover with the word "sewer" cast thereon.

D. Flushing Hydrant Assembly:

1. Furnish a 2" NPT 150 psi steel flushing hydrant assembly with a standard 2 ½" NST fire hose adapter and cap as shown on the Drawings. Assembly shall be freeze-proof with weep holes and shutoff valve with extension rod operated by corporation stop.

2.02 VAULT

A. Precast concrete vault with dimensions as shown on the Drawings shall be furnished and installed. Vault shall include a heavy duty steel waterproof access hatch in the top of the vault.

B. All precast components shall meet requirements ASTM C-478, latest revision, and ASTM C-890. Precast supplier shall be responsible for structural design of the structure and shall submit shop drawings and design calculations which have been signed and sealed by a registered structural engineer.

C. Access Frame and Cover: Furnish and install one (1) water tight access door with frame in aluminum material, complete with hinged and flush locking mechanism. Dimensions shall be as shown on the Drawings. Frame shall be securely placed, mounted at the location shown on the Drawings. Doors shall be of skid proof design.

2.03 PIPE AND FITTINGS

A. Furnish and install all pipe and fittings as shown and specified in the detail included with the Drawings.

PART 3: EXECUTION

3.01 INSTALLATION

A. All materials shall be installed as shown on the Drawings and in strict accordance with the manufacturer's recommendations.

3.02 QUALITY CONTROL AND FIELD TESTING

A. Quality Control: The manufacturer shall provide the services of a fully qualified representative for at least one (1) day to inspect the installation and provide start-up, operator and training services.

B. Field Testing: A representative of the manufacturer shall perform field tests to demonstrate that the performance of the equipment meets the specifications

3.03 SPARE PARTS

A. Furnish one (1) complete set of recommended spare parts for each valve and convey the spare parts to the Owner.

PART 4 – MEASUREMENT AND PAYMENT

A. The Force Main Flushing Connection will be measured and paid per each Force Main Flushing Connection installed. This item includes furnishing all equipment, materials, labor and other appurtenances necessary for a complete and fully functional installation as described on the project drawings and as specified herein, including, but not limited to, precast concrete vault with access hatch, and all piping, fittings and valves included inside the vault, the 3-inch plug valve and box located outside the vault, the piping and fittings needed to connect the flushing connection to the force main, and all other materials shown on the Drawings. The materials inside the vault include, but are not limited to, the flushing hydrant assembly, check valve, and all piping and fittings shown on the Drawings. Thrust blocks for restraint of fittings and also other joint restraint required are also included in this pay item.

B. This item shall be paid for at the price bid for per each Force Main Flushing Connection installed. This price shall include complete system installation, startup and testing. Final payment for this item will only occur after acceptance of this item by the Owner.

END OF SECTION

SECTION 11313 NORTHBOUND SEWER PUMP STATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and all related provisions of the Contract apply to this Section.

B. Electrical work associated with the Northbound Sewer Pump Station is specified in the following sections, which are incorporated by reference:

16010 – Basic Electrical Requirements
16050 – Basic Electrical Materials and Methods
16060 – Grounding and Bonding
16073 – Hangers and Supports for Electrical Systems
16075 – Electrical Identification
16120 – Conductors and Cables
16123 – Control-Voltage Electrical Power Cables
16130 – Raceways and Boxes
16140 – Wiring Devices
16289 – Surge-Protective Devices
16410 – Enclosed Switches and Circuit Breakers
16442 - Panelboards

1.2 SCOPE OF WORK

A. The work covered by this section consists of furnishing all parts, labor, equipment, materials and appliances and performing all operations for the installation of a packaged submersible centrifugal grinder sewage pump station, including fiberglass wetwell basin and integral valve vault, pumps, controls, electrical components, valves, piping, level control system and other accessories as shown on the drawings and as specified herein. Also included in this item is the demolition of the existing Northbound rest area septic system as described in the Drawings and the Measurement and Payment portion of this Section.

B. Submersible grinder pumps with motors under this section shall be installed on lift-out rail systems in order to allow for easy removal without requiring entry into the wetwell.

C. Unless otherwise noted, all materials and equipment supplied under this Section shall be new, of good quality, and in good condition.

D. All pumps furnished shall be the product of a single manufacturer.

1.3 SYSTEM DESCRIPTION

A. The Contractor shall furnish and install one (1) factory built, submersible grinder pump station, with all the necessary piping, controls, and appurtenances as shown on the plans and as specified herein. The submersible grinder pump station shall be complete with all necessary equipment installed in a fabricated fiberglass wetwell with integral valve vault. Entrance to each of the separate areas will be gained through rectangular entrance hatches.

B. Each pump shall be of the submersible centrifugal grinder type with recessed impeller with integral grinder unit and submersible motor. Pump shall be designed for automatic connection to the discharge connection elbow, guided by no less than two guide bars extending from the top of the station to the discharge elbow.

C. Pump(s) shall be installed in such a way that solids are fed in an upflow direction to the grinder impeller with no feet, rails or other obstructions below grinder inlet. Grinder shall be capable of macerating materials in normal domestic sewerage, including items used in maintaining normal sanitary hygiene such as disposable diapers, sanitary napkins, rubber and the like into a fine slurry.

A. Capacities and Characteristics:

1. Location: Existing Rest Area (Northbound-Pump Station No. 1)
2. Total Station Capacity: **45** gpm.
3. Number of Pumps: 2.
4. Operating Conditions:
   Primary Design Point: 45 gpm at 39 feet Total Dynamic Head (TDH)
   30 gpm at 58 feet Total Dynamic Head (TDH)
   Minimum Shut-off Head at 0 gpm: 65 feet
   System Static Head: 8 feet

5. Specifications:

   a. Type: Submersible Grinder.
   b. Pump Size: 2 inch discharge.
   c. Riser Pipe Size: 2 Inch.

d. Impeller Diameter: As recommended by manufacturer.
e. Motor Data:
   1) Motor Type: Constant Speed.
   2) Max. Horsepower: 5.0 HP, non-overloading for entire curve.
   3) Max. Speed: 3450 RPM.
   4) Voltage: 230 Volts.
   5) Phases: 1.
   6) Hertz:60.
   7) Control Panel Enclosure: NEMA 4X Stainless Steel.
   8) Thermal and Moisture Protection: Required.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include pump and appurtenance drawings, construction details, material descriptions, installation guidelines, technical manuals, and dimensions of individual components. Include rated capacities, pump curves, operating characteristics, electrical characteristics, control data, spare parts lists, and furnished specialties and accessories.

B. Structural Drawings: Detailed drawing and product submittals for the pre-cast concrete structure and accessories shall be submitted to the Engineer for approval. Submitted drawings shall be certified by a Professional Engineer licensed in the state where the project is located.

C. Design Computations: Design and buoyancy computations for the precast concrete foundation, walls, roof, and accessories shall be submitted to the Engineer for approval. Design computations shall be certified by a Professional Engineer licensed in the state where the project is located.

D. Wiring Diagrams: For power, signal, and control wiring.

E. Verification of Pumping Application: As part of the shop drawing submittal, the manufacturer shall supply a letter certifying that the manufacturer has reviewed the Contract drawings and specifications, including all addenda, and that the equipment and related accessories included in the shop drawing submittal are suitable for installation in the pumping application(s) proposed for the project.

F. Operation and Maintenance Manuals: The manufacturer shall submit operation and maintenance manuals for the equipment supplied in accordance with Division 01 Section "Operation and Maintenance Data".

1.5 QUALITY ASSURANCE

A. Manufacturer: The grinder pump station shall be supplied by a reputable manufacturer with at least ten (10) years of experience in the manufacture of submersible grinder pumps.

B. Factory Tests:

1. General: Each pump shall be subjected to run testing at the factory under simulated actual field conditions to check for proper motor and pump operation and watertightness, to check for excessive vibration, leaks, and operation of all automatic systems. The controls shall be adjusted to start and stop the pumps to satisfy field conditions.
2. Performance Test: Each pumping shall be factory tested in accordance with the ANSI/Hydraulic Institute standard 14.6, Grade 1B. Provide the Owner/Engineer the option of witnessing performance tests. Results of the shop performance test shall meet the specified performance requirements as listed in this specification. Final acceptance of pumping units shall depend upon the satisfactory operation as demonstrated by the final field tests.
3. Pump Test: The pump manufacturer shall perform the following inspections and tests on each pump before shipment from factory:

    a. Impeller, motor rating and electrical connections shall first be checked for compliance to the customer's purchase order.
    b. Insulation Test: A motor and cable insulation test for moisture content or insulation defects shall be made.
    c. Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.
    d. Operational Test: The pump shall be run submerged in water to a minimum of six (6) feet for not less than 30 minutes simulating actual service conditions.
    e. After Operational Test, the Insulation Test is to be performed again.

4. Test each pump for mechanical and electrical correctness after installation.
5. Hydraulically test each pumping unit after installation and establish an actual pump curve.

C. Perform field tests specified in this Section.

D. Pumps shall meet or exceed the requirements of the Hydraulic Institute.

E. A written statement indicating the foregoing steps have been done with each pump shall be supplied to the Engineer prior to shipment of the pump.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.6 DELIVERY, STORAGE, AND HANDLING

A. The equipment and materials shall be delivered, stored and handled in strict accordance with the manufacturer's recommendations.

B. Retain shipping flange protective covers and protective coatings during storage.

C. Protect bearings and couplings against damage.

D. Comply with pump manufacturer's written rigging instructions for handling.

1.7 WARRANTY

A. The Contractor shall include in the bid price for this item a guarantee to the Owner, from the manufacturer(s), for one (1) year from the date of final acceptance by the Owner (as described in Section 3), that the pumps, including ancillary equipment, apparatus and parts, shall be free from defective materials, equipment or workmanship, including with respect to equipment, the services of qualified factory trained servicemen, as may be required. Under the guarantee, the manufacturer shall furnish replacements for any component which proves defective, except those items that are normally consumed in service, such as light bulbs, oil, grease, packing, gaskets, "0" rings, etc. The pump manufacturer shall be solely responsible for the warranty of the station and all components. Components failing to perform as specified by the Engineer, or as represented by the manufacturer, or proved defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the manufacturer without cost of parts or labor to the Owner.

B. The warranty period shall be inviolate regardless of any component manufacturer's warranty for equipment and components within the station.

C. The manufacturer's warranty shall cover all equipment, components and systems provided in or with the station by the manufacturer of the station,

exclusive of those components supplied by and/or installed by others independent of the manufacturer of record for this station

D. The manufacturer shall assume liability for consequential damages or contingent liabilities arising out of the failure of any product of parts thereof to operate properly, however caused by or resulting from or arising out of defects in design or manufacture, delays in delivery, replacement, or otherwise.

E. If the submitted written manufacturer's warranty does not meet the minimum requirements set forth above, that submittal will forthrightly be rejected.

1.8 MANUFACTURER AND SUPPLIER INFORMATION

A. Manufacturer Nameplate: A manufacturer's nameplate shall be securely, permanently, and conspicuously mounted to each individual piece of equipment furnished under this Section. The nameplate shall be constructed of a durable, non-corrosive material. Critical information shall be clearly engraved or otherwise permanently stamped on the nameplate, and shall be fully legible. The information contained on the manufacturer nameplate shall include at least the following:

1. Manufacturer's Serial Number
2. Name, address and telephone number of equipment manufacturer
3. Model and/or Part Number, including pump impeller sizes, when applicable
4. Performance Criteria (i.e., capacity, design point, total dynamic head, etc.)
5. Motor size, speed and voltage
6. Enclosure Type or Rating
7. Any other pertinent information

B. Note: All equipment shall include a nameplate with a manufacturer serial number validating the equipment as new. Failure to meet these requirements will be cause for rejection of the equipment.

C. Supplier and Service Information: A durable nameplate, stamp or sticker shall be adhered to each individual piece of equipment containing the name, address, and telephone number of the local business that supplied the equipment, and the name, address and telephone number of the local business that can provide service and replacement parts for the equipment. A 24-hour emergency service telephone number should also be included.

PART 2 - PRODUCTS

2.1 PUMPS

A. Submersible grinder sewage pumps shall be capable of shredding solid materials typically found in raw, unscreened sewage and shall be constructed of cast iron which complies with the requirements of ASTM A48, Class 30.

B. Pump impeller shall be of the recessed type to provide an open unobstructed passage through the volute. Impeller shall be of 85-5-5-5 bronze and shall thread onto a type 416 stainless steel shaft. Impellers which might become obstructed during grinding or add excessive radial loads shall not be considered as equal.

C. Mechanical seals shall consist of upper and lower seals with an oil-filled chamber between the seals for lubricating seal faces and providing buffer zone to protect motor in event of first seal leakage. Upper seals shall have ceramic stationary faces and carbon rotating faces. Lower seals shall have tungsten carbide stationary and rotating faces. Metal parts and springs for seals shall be of 18/8 stainless steel. The seals shall require neither maintenance nor adjustment and shall be easily replaceable.

D. Grinder assembly shall consist of a single rotating grinder impeller and a single stationary shredding ring mounted directly below pump volute inlet. Grinder impeller shall thread onto shaft and shall be locked with a screw and washer. Shredding ring shall be held in place by a steel retaining clamp. Both shredding ring and grinder impeller shall be removable without dismantling pump. No adjustment of grinder assembly shall be necessary to proper grinder operation. Multiple grinder impeller assemblies requiring initial or periodic axial adjustment for proper operation shall not be considered equal. Grinder impeller and shredding ring shall be made of 440C stainless steel hardened to 56-60 Rockwell C.

E. All castings shall be of high tensile strength cast iron. Castings shall be treated with phosphate and chromic rinse prior to painting. Castings shall be painted in accordance with Division 09 Section "Painting".

F. All fasteners shall be of 300 series stainless steel.

G. Moisture detection probes shall be mounted in the oil chamber which is interlocked with the motor to shut down the pump and turn on a warning light on the motor control center when moisture is present in the oil chamber.

Thermistors mounted in the bottom of the stator housing may be used instead of the moisture detection probes.

H. The discharge connection elbows shall be permanently installed in the wet well along with the discharge piping. The pumps shall be automatically connected to the discharge connection elbows when lowered into place and shall be easily removed for inspection and service. Installation and removal of pumps shall not require personnel to enter the wet well. Individual pump and motor removal shall not interfere with continued operation of remaining pump(s).Sealing of the pump units to discharge connections shall be accomplished by linear downward motion of the pumps. Discharge connections shall have contact surfaces of non-sparking materials. Discharge elbows shall be of cast iron with integral bases for anchoring and supporting pumps and piping. Flanges shall conform to the requirements of ANSI/AWWA C110. The metal contact surfaces shall be of non-sparking materials.

I. The entire pump system, including pumps, motors, pump discharge connections, discharge elbows, guide rails, float switches and electrical cable, and pump guides shall be designed for Class 1, Groups C and D, Division 1, hazardous locations, as defined by the National Electrical Code and shall be so certified by an independent laboratory, so that forced wet well ventilation and redundant cut-off switches are not required.

J. A welded, type 304 stainless steel chain of adequate size shall be permanently attached to each pump. Provisions shall be made for attaching the upper end of each chain to the wet well access frame and cover.

K. Each submersible sewage pump shall have the capacity, minimum efficiency, and motor size specified herein.

L. Pumps shall be designed to be installed in such a way that solids are fed in an upflow direction to the impeller with no feet, rails or other obstructions below inlet.

2.2 MOTORS

A. Pump motors shall be supplied with the pump by the pump manufacturer as an integral part of the pump assembly. Motor shall be sealed, submersible type with a maximum rated horsepower, voltage and phases as specified herein.

B. Submersible pump motors shall be designed for Class 1, Groups C and D, Division 1, hazardous locations as defined by the National Electrical Code and shall be so certified by an independent laboratory. Motors shall be explosion

proof, squirrel cage induction type housed in an air or oil-filled cast iron watertight enclosure. The enclosure shall be sealed by O-rings and shall have rabbet joints with a large overlap. Cable leads shall be epoxy sealed. The motor shaft extension shall be stainless steel, impervious to the liquid and waste materials being pumped. All external hardware including motor nameplates shall be made of stainless steel.

C. Motors shall be NEMA Design B: insulation shall be Special Class F rated for continuous duty in 40°C liquids; shall have a 1.15 service factor; and shall be capable of 15 starts per hour. Pump motors shall have a cooling system capable of allowing for continuous operation in even non-submerged condition. The pump should be able to run dry under full load continuously for extended periods of time without damage. The pumps shall be furnished with power and control cords of sufficient length to connect directly to the motor control center without the need for splicing cables.

D. Motors shall be sized to ensure that they are non-overloading throughout the entire pump curve associated with this application.

E. Motor shall have two heavy duty ball bearings to support pump shaft and take radial and thrust loads and a sleeve guide bushing directly above the lower seal to take radial load and act as a flame path for seal chamber. Ball bearings shall be designed for a minimum B10 life of 50,000 hours.

F. A heat sensor thermostat shall be imbedded in top of winding and be connected in series with the motor starter coil in control box to stop motor if temperature rises in motor to over 220° F for any reason. Thermostat to reset automatically when temperature drops to a safe limit. Motors shall also be equipped with a moisture sensor which signals an alarm if moisture is present between the two seals.

G. Pump motor cables shall be suitable for submersible pump applications. Cable sizing shall conform to NEC requirements for the full load currents of the motors.

H. Cable entry system shall consist of three separate seals. A rubber grommet that seals both cable jackets shall be clamped onto cord by end holding cap. An "O" ring shall seal end holding cap to bottom half of cord cap. Both cables shall have individual conductors stripped and potted into motor end cap with epoxy potting compound. Potting compound shall prevent wicking of water into motor if the cable jacket becomes damaged. Cords shall withstand a pull of 150 pounds without loosening or losing integrity. The end holding cap shall have female threaded tapping for 1" conduit.

2.3 LIFT-OUT RAIL SYSTEM

A. Rail system shall consist of a combined check valve and seal fitting that mounts vertically into a stationary discharge casting. A simple downward motion shall connect pump and combined check valve and seal fitting to the stationary discharge casting. Check valve and seal fitting shall seal with two "O" rings and a tapered rubber seal ring into funnel of discharge case. Discharge casting shall be furnished with flanged discharge pipe connections. Valve casting and discharge casting shall be painted with a high quality, lead free, alkyd enamel finish. An upper guide plate shall be attached to pump to support lift-out fitting and guide pump on rails. Lifting lugs shall be cast into the motor housing and a stainless steel chain and clevice shall be furnished for lifting pump. Pump shall include a lifting bail for attachment of the stainless steel chain. Bail shall be of sufficient size to be easily caught by a hook in the event the chain breaks or becomes unfastened.

B. Two hold down brackets shall be provided to prevent pump and seal fitting from rising on rails. Guide rails shall be Schedule 40, type 304 stainless steel pipe sized based on manufacturers specification.

C. Rail support and mounting bushing shall be mounted to basin wall and shall not be attached to basin cover or cover frame.

D. Guide rail support shall be adjustable so that perfect vertical alignment of the rails can be obtained.

2.4 ACCESS HATCH FRAMES AND DOORS

A. Access hatch frames and covers shall be of all aluminum, watertight, non-skid, diamond plate construction reinforced for a 300 psi live load and furnished complete with hinges, and upper guide holder and level sensor(s) cable holder.

B. The frames shall be extruded and have type 316 stainless steel hinges and type 316 stainless steel tamper resistant bolts/locknuts. The frame shall include an extruded aluminum trough section with an integral anchor flange on all 4 sides. The frame shall include an EPDM gasket and a 1-1/2 inch threaded drain coupling.

C. Door leaves shall be ¼ inch thick aluminum diamond plate reinforced for a 300 psi live load.

D. The access door shall be equipped with a type 316 stainless steel hold open arms that automatically lock the doors in the 90 degree open position. A locking mechanism shall be supplied for security.

E. Double leaf access doors shall include two heavy duty check chains which span between each side of the door leaves when opened.

F. The frame shall be sealed to the tops of the wet well and valve vault and properly positioned to facilitate efficient removal of pumps and valves. They shall be of the minimum sizes shown on the Plans or selected by the station manufacturer. In no case shall access doors be less than that necessary to service pumps, valves and fittings within the vaults.

G. Frames shall be provided with sliding nut rails to attach the accessories required.

H. An adhesive backed vinyl material that protects the product during shipping and installation shall cover the entire top of the frame and cover. Installation shall be in accordance with the manufacturer's instructions.

2.5 ACCESSORIES

A. All bolts, machine screws, nuts, lockwashers, and other hardware used in the assembly of discharge elbows, guide rails, pump guides, hoist chains, float cable connectors, access frames and covers and other accessories shall be type 304 stainless steel.

2.6 PUMP STATION STRUCTURES

A. The wet well and integral valve vault structure shall each be 48 inches inside diameter and be constructed of fiberglass reinforced polyester with resin gelcoated surfaces. Minimum wall thickness shall be 3/8 inches and must be designed to withstand wall collapse based on the assumption of hydrostatic type loading by backfill with a density of 120 lb/ft^3. The basin's wall must be constructed to withstand or exceed two times the assumed loading for any depth of basin. The manufacturer shall provide buoyancy calculations for the station to the Engineer and Contractor. The Contractor shall provide sufficient stone and/or concrete, as per manufacturers' specification, to prevent floatation.

B. All precast wet well bases shall be monolithically poured complete with a bottom. When indicated on the drawings, precast concrete base sections shall be provided with extended base sections or increased bottom thickness to provide ballast to prevent flotation. Extended bases, as required by the

drawings, may be included in the monolithic pour of the base or integrally cast as approved by the Engineer.

C. All valves and piping associated with the wet well and valve vault shall conform to the requirements of the appropriate Contract specification sections and drawings. No steps shall be installed in the wetwell.

D. Exposed piping, fittings and valves inside the wet well and valve vault shall be as shown on the drawings. Stainless steel bolts shall be used on all flanged joints with anti-seize applied to threads. Flanged pipe shall be manufactured with threaded flanges. Bolt-on or adapter flanges are not acceptable.

2.7 CONTROLS

1. Controls:

   a. Enclosure: NEMA 250, Type 4X; Stainless Steel, pedestal-mounted.
   b. Switch Type: Mercury-float type switch, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
   c. Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
   d. Non-resettable elapsed time indicators for each pump.
   e. Five (5) float operation (pump off, lead pump on, lag pump on, high level alarm, spare).
   f. High level audible alarm and red LED rotating indicating beacon light on top of panel with auto reset and silence switch.
   g. HOA switch for each pump. Pump will not run in OFF. Pump will run in ON. Pump will run based on float levels when in AUTO. Pumps will lead-lag and alternate when both are in AUTO.
   h. Pump or controller failure will lockout pump and switch to single pump operation.
   i. Run light for each pump.
   j. High temperature detection for each pump. Operation shall shut down and lockout pump. Provide high temperature indicating light and manual reset switch for each pump.
   k. Seal failure detection for each pump. Operation shall activate alarm. Provide seal failure indicating light for each pump.
   l. 22 mm metallic LED indicating lights with engraved phenolic functional description plate (attached with stainless steel screws).
   m. 22 mm metallic switches with engraved phenolic functional description plate (attached with stainless steel screws).
   n. Complete wiring diagrams showing both factory and field installed wiring.

o. Factory labeled terminal strips for all field connections. Coordinate labeling with wiring diagram indications.

2. Control-Interface Features:

a. Remote Alarm Contacts: For remote alarm interface (for future use).

2.8 ELECTRICAL

A. All electrical work for the Northbound Sewer Pump Station is included in the lump sum.pay item, and includes all electrical work, including electrical panels, at the pump station and between the pump station and the power feed panel in the rest area building. Electrical work is to be furnished and performed in accordance with the specification sections referenced previously in this Section.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation and filling are specified in other Sections. However, all earthwork associated with the Northbound Sewer Pump Station is included in the lump sum pay item for the pump station.

3.2 INSTALLATION

A. All equipment and materials shall be installed in a neat, workmanlike manner in strict accordance with the manufacturer's recommendations and all applicable requirements of agencies having jurisdiction.

B. Pumps, piping, valves and other equipment shall be erected and installed by competent, skilled mechanics at the exact positions and elevations shown on the Plans.

C. All equipment and connecting piping shall be installed and supported in such manner that no load from the piping will be carried by the pumps.

3.3 QUALITY CONTROL AND FIELD TESTING

A. The Contractor shall furnish the services of a factory-authorized technical representative for one (1) full day at the job site to inspect, test, adjust components, assemblies, and equipment installations, and provide start-up and operator training. The technical representative shall be responsible to ensure that all pumps, motors, equipment, controls, alarms, wiring and all associated components are properly installed and functioning properly.

B. Field Testing:

1. The Contractor shall notify the Engineer that all or portions of the work are ready for testing. All testing shall be scheduled with the Engineer, who will coordinate with the Owner, and respond to the Contractor regarding a mutually available date and time for the necessary testing. All testing shall be done in the presence of the Engineer. All labor, equipment, water and other materials, including meters and gauges, shall be furnished by the Contractor at his own expense.
2. Each pump shall be field tested, as described below, by the manufacturer's technical representative to demonstrate that the pump performance meets the requirements of the drawings and specifications. The manufacturer shall provide and install any gauges, meters or other devices needed for the field tests.
3. The Contractor shall furnish all necessary oil, grease and other materials and supplies for the operation of the equipment during the initial trial operation.
4. Pump start up and testing shall be done in the presence of the Engineer and shall demonstrate conformance to the conditions shown on the contract drawings.

C. After installation, but prior to backfill around the station, the wet well shall be filled with clean water and allowed to stand for 24 hours (minimum) after which the water level shall be measured to determine if leakage has occurred. If leaking is noted, the wet well shall be drained, the leakage repaired, and the test repeated. After satisfactory completion of the hydrostatic test of the wet well, a drawdown test and start-up shall be performed. A factory representative shall be on site for this test. Each pump shall be run through 3 drawdown cycles, measuring drawdown and timing the run to compute pumping rate. Clean water shall be used for the drawdown test. The controls shall be checked for operation in the automatic and manual operation modes. The level control system shall be checked for proper elevations and operation. The telemetry system and alarms shall be programmed and checked for proper operation.

D. Pumps and controls will be considered defective if they do not pass tests and inspections.

E. The factory-authorized technical representative shall prepare and submit three copies of all necessary test results and inspection reports.

3.4 ADJUSTING

A. Adjust pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust control set points and other features as necessary for proper performance.

3.5 DEMONSTRATION OF ACCEPTABLE PERFORMANCE

A. All equipment associated with this specification shall be subject to a minimum 30 day performance trial period. After start-up, but prior to acceptance by the Owner, the equipment shall operate within the specified parameters requiring only routine operations and normal maintenance. If, at any time during this trial period, the equipment fails to perform as required by this specification, the Contractor shall be required to make the necessary repairs, modifications or adjustments to this equipment to allow it to operate as specified. These modifications shall be accomplished within 30 days of notification by the Owner to the Contractor. The Contractor shall be responsible for any damages suffered by the Owner, either direct or indirect, resulting from the failure of this equipment to perform as specified at any time prior to acceptance. After the necessary equipment adjustments/modifications have been completed, a new 30 day performance trial period shall begin. If, at any time during this second trial period, the equipment, again, fails to perform as required by this specification, the Owner may elect to either have the equipment replaced at the expense of the Contractor or have the cost of this equipment refunded as indicated in the Schedule of Values established for this project. After satisfactory performance of the equipment during the indicated performance trail period, the Owner will issue a written acceptance of the equipment and the warranty period shall be established.

3.6 SPARE PARTS

A. The Contractor shall furnish one (1) complete set of spare parts as detailed below for each pump supplied on this contract. Spare parts shall be conveyed to the Owner.

Upper and Lower Mechanical Seal
Motor Cable
Cable Grommet
Inspection Plug Washer
Upper Bearing
Lower Bearing
Shredding Ring
Cable Entry Washer
O-Ring Kit
Grinder Impeller
Impeller Key
Impeller Bolt

PART 4 – MEASUREMENT AND PAYMENT

1. The Northbound Sewer Pump Station will be measured and paid as a single lump sum amount to include furnishing all equipment, materials, labor and other appurtenances necessary for a complete and fully functional installation as described on the project drawings and as specified herein, including, but not limited to, the pump station wetwell and integral valve vault, concrete foundation for wetwell, stone subbase beneath the wetwell foundation, all electrical work between the pump station and the electrical power panel inside the rest area building, all electrical panels at the pump station, excavation, backfill, and all related site work including rock excavation, pumps and accessories and equipment start-up services, all piping, fitting, valves and related ancillary items inside the structures and to within 5 feet outside of the valve vault, and demolition of the existing rest area septic system as described on the Drawings.

2. Included in the Northbound Sewer Pump Station lump sum pay item is the demolition of the existing septic system at the Northbound Rest Area. This work is described on the Drawings. The Contractor shall remove existing pumps, control panel, electrical materials, valves and piping and convey the existing pumps and control panel to NCDOT, remove and dispose of all sewage and sludge in the existing septic and pump tanks, remove the concrete masonry walls for the septic and pump tanks, and backfill and compact the area with clean fill. In addition, the Contractor shall remove and dispose of the two existing precast distribution vaults located in the existing septic nitrification field. Contractor shall confirm actual locations with NCDOT personnel.

3. This item shall be paid for at the lump sum price bid for the item. This price shall include complete system installation, startup and testing. Final payment for this item will only occur after acceptance of this item by the Owner.

END OF SECTION

SECTION 11314 SOUTHBOUND SEWER PUMP STATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and all related provisions of the Contract apply to this Section.

B. Electrical work associated with the Southbound Sewer Pump Station is specified in the following sections, which are incorporated by reference:

16010 – Basic Electrical Requirements
16050 – Basic Electrical Materials and Methods
16060 – Grounding and Bonding
16073 – Hangers and Supports for Electrical Systems
16075 – Electrical Identification
16120 – Conductors and Cables
16123 – Control-Voltage Electrical Power Cables
16130 – Raceways and Boxes
16140 – Wiring Devices
16289 – Surge-Protective Devices
16410 – Enclosed Switches and Circuit Breakers
16442 - Panelboards

1.2 SCOPE OF WORK

A. The work covered by this section consists of furnishing all parts, labor, equipment, materials and appliances and performing all operations for the installation of a packaged submersible centrifugal grinder sewage pump station, including fiberglass wetwell basin and integral valve vault, pumps, controls, electrical components, valves, piping, level control system and other accessories as shown on the drawings and as specified herein. Also included in this item is the pump station fencing, prefabricated fiberglass odor control building, and all contents of the odor control building shown on the Drawings and specified herein, including, but not limited to, metering pumps, chemical tanks filled with specified odor control chemical, building heater, fan, all electrical, reinforced concrete building foundation, stone subbase for concrete foundation, and other building components.

B. Submersible grinder pumps with motors under this section shall be installed on lift-out rail systems in order to allow for easy removal without requiring entry into the wetwell.

C. Unless otherwise noted, all materials and equipment supplied under this Section shall be new, of good quality, and in good condition.

D. All pumps furnished shall be the product of a single manufacturer.

E. Prefabricated Fiberglass Odor Control Building: Furnish all labor, equipment, materials and incidentals required to completely furnish and install a prefabricated fiberglass storage building as shown on the Drawings and specified herein, including, but not limited to, metering pumps, chemical tanks filled with specified odor control chemical, building heater, fan, all electrical, reinforced concrete building foundation, stone subbase for concrete foundation, and other building components. The manufacturer shall provide all related accessories required for a complete, operational building, whether or not the accessories are specifically listed in this section. The fiberglass building shall be manufactured by Warminster Fiberglass, Plast-Fab, Wallace & Tiernan, or equal.

1.3 SYSTEM DESCRIPTION

A. The Contractor shall furnish and install one (1) factory built, submersible grinder pump station, with all the necessary piping, controls, and appurtenances as shown on the plans and as specified herein. The submersible grinder pump station shall be complete with all necessary equipment installed in a fabricated fiberglass wetwell with integral valve vault. Entrance to each of the separate areas will be gained through rectangular entrance hatches.

B. Each pump shall be of the submersible centrifugal grinder type with recessed impeller with integral grinder unit and submersible motor. Pump shall be designed for automatic connection to the discharge connection elbow, guided by no less than two guide bars extending from the top of the station to the discharge elbow.

C. Pump(s) shall be installed in such a way that solids are fed in an upflow direction to the grinder impeller with no feet, rails or other obstructions below grinder inlet. Grinder shall be capable of macerating materials in normal domestic sewerage, including items used in maintaining normal sanitary hygiene such as disposable diapers, sanitary napkins, rubber and the like into a fine slurry.

D Pump Capacities and Characteristics:

Pump Station No. 2

1. Location: New Rest Area (Southbound – Pump Station No. 2)
2. Total Station Capacity: **55** gpm.
3. Number of Pumps: 2.
4. Operating Conditions:
   Primary Design Point: 55 gpm at 119 feet Total Dynamic Head (TDH)
   45 gpm at 125 feet Total Dynamic Head (TDH)
   Minimum Shut-off Head at 0 gpm: 140 feet
   System Static Head: 8 feet

5. Specifications:

   a. Type: Submersible Grinder.
   b. Pump Size: 2 inch discharge.
   c. Riser Pipe Size: 2 Inch.
   d. Impeller Diameter: As recommended by manufacturer.
   e. Motor Data:
      1) Motor Type: Constant Speed.
      2) Max. Horsepower: 5.0 HP, non-overloading for entire curve.
      3) Max. Speed: 3450 RPM.
      4) Voltage: 230 Volts.
      5) Phases: 1.
      6) Hertz:60.
      7) Control Panel Enclosure: NEMA 4X Stainless Steel.
      8) Thermal and Moisture Protection: Required.

E. Fencing: Unless otherwise indicated on the plans, all fencing will be 6'-0" nominal height, using 2", 9-gauge woven wire mesh fabric with 3 strands of barbed wire hung on angle brackets. The fencing will be supported by posts and a top rail. Fencing shall include PVC fence slats inside chain link mesh to provide 75% privacy blockage.

F. Prefabricated Fiberglass Odor Control Building: Furnish and install one (1) 8 feet long by 8 feet wide by 7 feet high fiberglass odor control building as specified herein, including reinforced concrete foundation. Concrete strength design for building foundation to be 4,000 psi at 28 days.

1.4 SUBMITTALS

A. Sewage Pumps and Chemical Feed Metering Pumps - Product Data: For each type of product indicated, include pump and appurtenance drawings, construction details, material descriptions, installation guidelines, technical manuals, and dimensions of individual components. Include rated capacities, pump curves, operating characteristics, electrical characteristics, control data, spare parts lists, and furnished specialties and accessories.

B. Structural Drawings: Detailed drawing and product submittals for the pre-cast concrete wetwell foundation structure and accessories shall be submitted to the Engineer for approval. Submitted drawings shall be certified by a Professional Engineer licensed in the state where the project is located. Submit concrete mix design for concrete for odor control building foundation.

C. Design Computations: Design and buoyancy computations for the precast concrete foundation, walls, roof, and accessories shall be submitted to the Engineer for approval. Design computations shall be certified by a Professional Engineer licensed in the state where the project is located.

D. Electrical: Submit wiring Diagrams for power, signal, and control wiring. Refer to electrical specification sections for additional submittals required.

E. Verification of Pumping Application: As part of the shop drawing submittal, the manufacturer shall supply a letter certifying that the manufacturer has reviewed the Contract drawings and specifications, including all addenda, and that the equipment and related accessories included in the shop drawing submittal are suitable for installation in the pumping application(s) proposed for the project.

F. Operation and Maintenance Manuals: The manufacturer shall submit three (3) copies of operation and maintenance manuals for each equipment component supplied.

G. Prefabricated Fiberglass Odor Control Building: Submit complete specifications to describe the materials of construction and all related accessories, including concrete mix design for building foundation. Submit drawings, diagrams and catalog cuts for built-in louvers, fans, heaters, lighting, electrical receptacles, switches, and other accessories. Also submit detailed installation instructions, including reinforcing steel erection drawing for the concrete building foundation..

H. Fencing: Shop drawings shall include material specifications and manufacturer's drawings for chain link fencing, privacy slats, posts, gates, concrete foundations, and all related accessories.

1.5 QUALITY ASSURANCE

A. Manufacturer: The prefabricated grinder pump station shall be supplied by a reputable manufacturer with at least ten (10) years of experience in the manufacture of submersible grinder pumps. Chemical metering pumps prefabricated fiberglass building shall be furnished by reputable manufacturers with at least ten (10) years of experience in the manufacture of similar equipment and materials.

B. Factory Tests – Sewage Grinder Pumps:

1. General: Each pump shall be subjected to run testing at the factory under simulated actual field conditions to check for proper motor and pump operation and watertightness, to check for excessive vibration, leaks, and operation of all automatic systems. The controls shall be adjusted to start and stop the pumps to satisfy field conditions.

2. Performance Test: Each pumping shall be factory tested in accordance with the ANSI/Hydraulic Institute standard 14.6, Grade 1B. Provide the Owner/Engineer the option of witnessing performance tests. Results of the shop performance test shall meet the specified performance requirements as listed in this specification. Final acceptance of pumping units shall depend upon the satisfactory operation as demonstrated by the final field tests.

3. Pump Test: The pump manufacturer shall perform the following inspections and tests on each pump before shipment from factory:

   a. Impeller, motor rating and electrical connections shall first be checked for compliance to the customer's purchase order.
   b. Insulation Test: A motor and cable insulation test for moisture content or insulation defects shall be made.
   c. Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.
   d. Operational Test: The pump shall be run submerged in water to a minimum of six (6) feet for not less than 30 minutes simulating actual service conditions.
   e. After Operational Test, the Insulation Test is to be performed again.

4. Test each pump for mechanical and electrical correctness after installation.
5. Hydraulically test each pumping unit after installation and establish an actual pump curve.

C. Perform field tests specified in this Section.

D. Sewage grinder pumps shall meet or exceed the requirements of the Hydraulic Institute.

E. A written statement indicating the foregoing steps have been done with each pump shall be supplied to the Engineer prior to shipment of the sewage grinder pumps.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Sewage Grinder Pumps - UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.6 DELIVERY, STORAGE, AND HANDLING

A. The equipment and materials shall be delivered, stored and handled in strict accordance with the manufacturer's recommendations.

B. Retain shipping flange protective covers and protective coatings during storage.

C. Protect bearings and couplings against damage.

D. Comply with pump manufacturer's written rigging instructions for handling.

1.7 WARRANTY

A. The Contractor shall include in the bid price for this item a guarantee to the Owner, from the manufacturer(s), for one (1) year from the date of final acceptance by the Owner (as described in Section 3), that the sewage and chemical feed pumps, including control panel and ancillary equipment, apparatus and parts, shall be free from defective materials, equipment or workmanship, including with respect to equipment, the services of qualified factory trained servicemen, as may be required. Under the guarantee, the manufacturer shall furnish replacements for any component which proves defective, except those items that are normally consumed in service, such as

light bulbs, oil, grease, packing, gaskets, "0" rings, etc. The pump manufacturer shall be solely responsible for the warranty of the station and all components. Components failing to perform as specified by the Engineer, or as represented by the manufacturer, or proved defective in service during the warranty period, shall be replaced, repaired, or satisfactorily modified by the manufacturer without cost of parts or labor to the Owner.

B. The warranty period shall be inviolate regardless of any component manufacturer's warranty for equipment and components within the station.

C. The manufacturer's warranty shall cover all equipment, components and systems provided in or with the station by the manufacturer of the station, exclusive of those components supplied by and/or installed by others independent of the manufacturer of record for this station

D. The manufacturer shall assume liability for consequential damages or contingent liabilities arising out of the failure of any product of parts thereof to operate properly, however caused by or resulting from or arising out of defects in design or manufacture, delays in delivery, replacement, or otherwise.

E. If the submitted written manufacturer's warranty does not meet the minimum requirements set forth above, that submittal will forthrightly be rejected.

1.8 MANUFACTURER AND SUPPLIER INFORMATION

A. Manufacturer Nameplate: A manufacturer's nameplate shall be securely, permanently, and conspicuously mounted to each individual piece of equipment furnished under this Section. The nameplate shall be constructed of a durable, non-corrosive material. Critical information shall be clearly engraved or otherwise permanently stamped on the nameplate, and shall be fully legible. The information contained on the manufacturer nameplate shall include at least the following:

1. Manufacturer's Serial Number
2. Name, address and telephone number of equipment manufacturer
3. Model and/or Part Number, including pump impeller sizes, when applicable
4. Performance Criteria (i.e., capacity, design point, total dynamic head, etc.)
5. Motor size, speed and voltage
6. Enclosure Type or Rating
7. Any other pertinent information

B. Note: All equipment shall include a nameplate with a manufacturer serial number validating the equipment as new. Failure to meet these requirements will be cause for rejection of the equipment.

C. Supplier and Service Information: A durable nameplate, stamp or sticker shall be adhered to each individual piece of equipment containing the name, address, and telephone number of the local business that supplied the equipment, and the name, address and telephone number of the local business that can provide service and replacement parts for the equipment. A 24-hour emergency service telephone number should also be included.

PART 2 - PRODUCTS

2.1 SEWAGE PUMPS

A. Submersible grinder sewage pumps shall be capable of shredding solid materials typically found in raw, unscreened sewage and shall be constructed of cast iron which complies with the requirements of ASTM A48, Class 30.

B. Pump impeller shall be of the recessed type to provide an open unobstructed passage through the volute. Impeller shall be of 85-5-5-5 bronze and shall thread onto a type 416 stainless steel shaft. Impellers which might become obstructed during grinding or add excessive radial loads shall not be considered as equal.

C. Mechanical seals shall consist of upper and lower seals with an oil-filled chamber between the seals for lubricating seal faces and providing buffer zone to protect motor in event of first seal leakage. Upper seals shall have ceramic stationary faces and carbon rotating faces. Lower seals shall have tungsten carbide stationary and rotating faces. Metal parts and springs for seals shall be of 18/8 stainless steel. The seals shall require neither maintenance nor adjustment and shall be easily replaceable.

D. Grinder assembly shall consist of a single rotating grinder impeller and a single stationary shredding ring mounted directly below pump volute inlet. Grinder impeller shall thread onto shaft and shall be locked with a screw and washer. Shredding ring shall be held in place by a steel retaining clamp. Both shredding ring and grinder impeller shall be removable without dismantling pump. No adjustment of grinder assembly shall be necessary to proper grinder operation. Multiple grinder impeller assemblies requiring initial or periodic axial adjustment for proper operation shall not be considered equal. Grinder impeller and

shredding ring shall be made of 440C stainless steel hardened to 56-60 Rockwell C.

E. All castings shall be of high tensile strength cast iron. Castings shall be treated with phosphate and chromic rinse prior to painting. Castings shall be painted in accordance with Division 09 Section "Painting".

F. All fasteners shall be of 300 series stainless steel.

G. Moisture detection probes shall be mounted in the oil chamber which is interlocked with the motor to shut down the pump and turn on a warning light on the motor control center when moisture is present in the oil chamber. Thermistors mounted in the bottom of the stator housing may be used instead of the moisture detection probes.

H. The discharge connection elbows shall be permanently installed in the wet well along with the discharge piping. The pumps shall be automatically connected to the discharge connection elbows when lowered into place and shall be easily removed for inspection and service. Installation and removal of pumps shall not require personnel to enter the wet well. Individual pump and motor removal shall not interfere with continued operation of remaining pump(s).Sealing of the pump units to discharge connections shall be accomplished by linear downward motion of the pumps. Discharge connections shall have contact surfaces of non-sparking materials. Discharge elbows shall be of cast iron with integral bases for anchoring and supporting pumps and piping. Flanges shall conform to the requirements of ANSI/AWWA C110. The metal contact surfaces shall be of non-sparking materials.

I. The entire pump system, including pumps, motors, pump discharge connections, discharge elbows, guide rails, float switches and electrical cable, and pump guides shall be designed for Class 1, Groups C and D, Division 1, hazardous locations, as defined by the National Electrical Code and shall be so certified by an independent laboratory, so that forced wet well ventilation and redundant cut-off switches are not required.

J. A welded, type 304 stainless steel chain of adequate size shall be permanently attached to each pump. Provisions shall be made for attaching the upper end of each chain to the wet well access frame and cover.

K. Each submersible sewage pump shall have the capacity, minimum efficiency, and motor size specified herein.

L. Pumps shall be designed to be installed in such a way that solids are fed in an upflow direction to the impeller with no feet, rails or other obstructions below inlet.

2.2 MOTORS – SEWAGE PUMPS

A. Pump motors shall be supplied with the pump by the pump manufacturer as an integral part of the pump assembly. Motor shall be sealed, submersible type with a maximum rated horsepower, voltage and phases as specified herein.

B. Submersible pump motors shall be designed for Class 1, Groups C and D, Division 1, hazardous locations as defined by the National Electrical Code and shall be so certified by an independent laboratory. Motors shall be explosion proof, squirrel cage induction type housed in an air or oil-filled cast iron watertight enclosure. The enclosure shall be sealed by O-rings and shall have rabbet joints with a large overlap. Cable leads shall be epoxy sealed. The motor shaft extension shall be stainless steel, impervious to the liquid and waste materials being pumped. All external hardware including motor nameplates shall be made of stainless steel.

C. Motors shall be NEMA Design B: insulation shall be Special Class F rated for continuous duty in 40°C liquids; shall have a 1.15 service factor; and shall be capable of 15 starts per hour. Pump motors shall have a cooling system capable of allowing for continuous operation in even non-submerged condition. The pump should be able to run dry under full load continuously for extended periods of time without damage. The pumps shall be furnished with power and control cords of sufficient length to connect directly to the motor control center without the need for splicing cables.

D. Motors shall be sized to ensure that they are non-overloading throughout the entire pump curve associated with this application.

E. Motor shall have two heavy duty ball bearings to support pump shaft and take radial and thrust loads and a sleeve guide bushing directly above the lower seal to take radial load and act as a flame path for seal chamber. Ball bearings shall be designed for a minimum B10 life of 50,000 hours.

F. A heat sensor thermostat shall be imbedded in top of winding and be connected in series with the motor starter coil in control box to stop motor if temperature rises in motor to over 220° F for any reason. Thermostat to reset automatically when temperature drops to a safe limit. Motors shall also be equipped with a moisture sensor which signals an alarm if moisture is present between the two seals.

G. Pump motor cables shall be suitable for submersible pump applications. Cable sizing shall conform to NEC requirements for the full load currents of the motors.

H. Cable entry system shall consist of three separate seals. A rubber grommet that seals both cable jackets shall be clamped onto cord by end holding cap. An "O" ring shall seal end holding cap to bottom half of cord cap. Both cables shall have individual conductors stripped and potted into motor end cap with epoxy potting compound. Potting compound shall prevent wicking of water into motor if the cable jacket becomes damaged. Cords shall withstand a pull of 150 pounds without loosening or losing integrity. The end holding cap shall have female threaded tapping for 1" conduit.

2.3 LIFT-OUT RAIL SYSTEM

A. Rail system shall consist of a combined check valve and seal fitting that mounts vertically into a stationary discharge casting. A simple downward motion shall connect pump and combined check valve and seal fitting to the stationary discharge casting. Check valve and seal fitting shall seal with two "O" rings and a tapered rubber seal ring into funnel of discharge case. Discharge casting shall be furnished with flanged discharge pipe connections. Valve casting and discharge casting shall be painted with a high quality, lead free, alkyd enamel finish. An upper guide plate shall be attached to pump to support lift-out fitting and guide pump on rails. Lifting lugs shall be cast into the motor housing and a stainless steel chain and clevice shall be furnished for lifting pump. Pump shall include a lifting bail for attachment of the stainless steel chain. Bail shall be of sufficient size to be easily caught by a hook in the event the chain breaks or becomes unfastened.

B. Two hold down brackets shall be provided to prevent pump and seal fitting from rising on rails. Guide rails shall be Schedule 40, type 304 stainless steel pipe sized based on manufacturers specification.

C. Rail support and mounting bushing shall be mounted to basin wall and shall not be attached to basin cover or cover frame.

D. Guide rail support shall be adjustable so that perfect vertical alignment of the rails can be obtained.

2.4 ACCESS HATCH FRAMES AND DOORS

A. Access hatch frames and covers shall be of all aluminum, watertight, non-skid, diamond plate construction reinforced for a 300 psi live load and furnished complete with hinges, and upper guide holder and level sensor(s) cable holder.

B. The frames shall be extruded and have type 316 stainless steel hinges and type 316 stainless steel tamper resistant bolts/locknuts. The frame shall include an extruded aluminum trough section with an integral anchor flange on all 4 sides. The frame shall include an EPDM gasket and a 1-1/2 inch threaded drain coupling.

C. Door leaves shall be ¼ inch thick aluminum diamond plate reinforced for a 300 psi live load.

D. The access door shall be equipped with a type 316 stainless steel hold open arms that automatically lock the doors in the 90 degree open position. A locking mechanism shall be supplied for security.

E. Double leaf access doors shall include two heavy duty check chains which span between each side of the door leaves when opened.

F. The frame shall be sealed to the tops of the wet well and valve vault and properly positioned to facilitate efficient removal of pumps and valves. They shall be of the minimum sizes shown on the Plans or selected by the station manufacturer. In no case shall access doors be less than that necessary to service pumps, valves and fittings within the vaults.

G. Frames shall be provided with sliding nut rails to attach the accessories required.

H. An adhesive backed vinyl material that protects the product during shipping and installation shall cover the entire top of the frame and cover. Installation shall be in accordance with the manufacturer's instructions.

2.5 SEWAGE PUMP ACCESSORIES

A. All bolts, machine screws, nuts, lockwashers, and other hardware used in the assembly of discharge elbows, guide rails, pump guides, hoist chains, float cable connectors, access frames and covers and other accessories shall be type 304 stainless steel.

2.6 SEWAGE PUMP STATION STRUCTURES

A. The wet well and integral valve vault structure shall each be 48 inches inside diameter and be constructed of fiberglass reinforced polyester with resin gelcoated surfaces. Minimum wall thickness shall be 3/8 inches and must be designed to withstand wall collapse based on the assumption of hydrostatic type loading by backfill with a density of 120 lb/ft^3. The basin's wall must be constructed to withstand or exceed two times the assumed loading for any depth of basin. The manufacturer shall provide buoyancy calculations for the station to the Engineer and Contractor. The Contractor shall provide sufficient stone and/or concrete, as per manufacturers' specification, to prevent floatation.

B. All precast wet well bases shall be monolithically poured complete with a bottom. When indicated on the drawings, precast concrete base sections shall be provided with extended base sections or increased bottom thickness to provide ballast to prevent flotation. Extended bases, as required by the drawings, may be included in the monolithic pour of the base or integrally cast as approved by the Engineer.

C. All valves and piping associated with the wet well and valve vault shall conform to the requirements of the appropriate Contract specification sections and drawings. No steps shall be installed in the wetwell.

D. Exposed piping, fittings and valves inside the wet well and valve vault shall be as shown on the drawings. Stainless steel bolts shall be used on all flanged joints with anti-seize applied to threads. Flanged pipe shall be manufactured with threaded flanges. Bolt-on or adapter flanges are not acceptable.

2.7 SEWAGE PUMP CONTROLS

1. Controls:

    a. Enclosure: NEMA 250, Type 4X; Stainless Steel, pedestal-mounted.
    b. Switch Type: Mercury-float type switch, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
    c. Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
    d. Non-resettable elapsed time indicators for each pump.
    e. Five (5) float operation (pump off, lead pump on, lag pump on, high level alarm, spare).
    f. High level audible alarm and red LED rotating indicating beacon light on top of panel with auto reset and silence switch.

g. HOA switch for each pump. Pump will not run in OFF. Pump will run in ON. Pump will run based on float levels when in AUTO. Pumps will lead-lag and alternate when both are in AUTO.
h. Pump or controller failure will lockout pump and switch to single pump operation.
i. Run light for each pump.
j. High temperature detection for each pump. Operation shall shut down and lockout pump. Provide high temperature indicating light and manual reset switch for each pump.
k. Seal failure detection for each pump. Operation shall activate alarm. Provide seal failure indicating light for each pump.
l. 22 mm metallic LED indicating lights with engraved phenolic functional description plate (attached with stainless steel screws).
m. 22 mm metallic switches with engraved phenolic functional description plate (attached with stainless steel screws).
n. Complete wiring diagrams showing both factory and field installed wiring.
o. Factory labeled terminal strips for all field connections. Coordinate labeling with wiring diagram indications.

2. Control-Interface Features:

a. Remote Alarm Contacts: For remote alarm interface (for future use).

b. Chemical feed pump contacts: For remote control of chemical feed pump contactor. Provide normally open contact that will close when one or two sewage pumps are operating.

2.8 FENCING

A. Chain Link Fencing:

1. Fabric shall be Class 2B chain link; vinyl coating fused and adhered onto zinc coated wire per ASTM Specification A-392-Latest Revision. The Contractor shall coordinate the final fencing color with the Owner.

2. Barbed wire shall have a Class 3 galvanized coating per ASTM A121-Latest Revision and consist of two 12-1/2 gauge stranded wire lines with 14 gauge barbs in a four point pattern on 5" centers.

3. Top rail shall be 1-1/4" standard weight pipe.

4. Line posts shall be 2" standard weight pipe, or 4.1 lb. per foot "H" section.

5. End, corner and pull posts shall be 2-7/8" OD pipe ± 5.79 lb. per foot, or 3-1/4" by 3-1/4" roll formed sections with integral fabric loops, 5.14 lb. per foot.

B. Swing Gate Posts: Posts for swing gates shall be sized according to the following gate leaf widths:

		lb. per lin. ft.
Up to 6'	3-1/3" x 3-1/2" roll formed section or 2-7\8" OD Pipe	5.14 5.79
Over 6' to 13'	4" OD Pipe	9.11
Over 13' to 18'	6-5/8" OD Pipe	18.97
Over 18'	8-5/8" OD Pipe	24.70

C. Gate Frames: Gate frames shall be 1.90" OD connected with fittings riveted at each corner. Each frame shall have 3/8" diameter adjustable truss rods. Gates shall have positive type latching devices with provision for padlocking; and drive gates shall have a center plunger rod, catch, and semi-automatic outer catches.

D. Coatings: All posts, rails, and appurtenances shall be hot-dipped zinc coated steel according to ASTM Specifications A-120-Latest Revision and A-123-Latest Revision or A-153-Latest Revision whichever is applicable. The Contractor shall coordinate final coating color with the Owner. Pipe posts shall have tops which exclude moisture.

E. Slats: All chain link fencing, including gates, shall include PVC fence slats in the chain link mesh to provide 75% privacy blockage. Fence slats shall be of the width and thickness as recommended by the fence manufacturer, and shall be attached to the chain link mesh as recommended by the fence manufacturer.

2.9 FIBERGLASS BUILDING

1. General: Building shall be one piece molded construction with no joints, designed to withstand 125 mph winds at 30 psf snow load. Doors shall be one piece molded construction. Building shall have interior dimensions of 8 feet long by 8 feet wide, with a height of 7 feet.

2. Exterior Surface: Satin gel-coated finish with white color molded in. Surface shall be free of pits, porosity, cracks and crazes. A 1/8" thick laminate shell cover the gel-coat. The laminate shall consist of polyester resin and fiberglass, with a minimum glass content of 25%.

3. Inner Core: Two (2) pound density, rigid closed cell, self-extinguishing foam minimum 1" thick, with a minimum R rating of 6.7. The interior laminate shall encapsulate the foam to form a sandwich construction.

4. Fiberglass laminate: The fiberglass laminate shall meet the following minimum physical properties using the applicable ASTM Standards:

Tensile Strength	14,000 psi (ASTM D638)
Flexural Strength	25,000 psi (ASTM D790)
Impact, Notched Izod	15 ft.-lb.in (ASTM D256)
Barcol Hardness	40 min. avg. (ASTM D2583)
Water Absorption	0.1%/24 hrs. (ASTM D570)
Avg. coefficient of thermal expansion	10.5 x 10.6 in. per in. per degree F. (ASTM D696)

5. Mounting flange: Building shall have a 4" wide internal flange around the perimeter, pre-drilled for bolting to a concrete pad. A base flange neoprene gasket shall be provided.

6. Fiberglass Doors: Composite material to be identical to walls, with stainless steel piano hinge, two point locking latch, and 12" Square Safety glass window. A neoprene gasket shall be provided for a tight weatherproof seal. Furnish two (2) 3'0" wide by 6'4" high doors.

7. Lifting eyes: Cadmium plated, and removable.

8. Eyewash Station: Emergency eyewash station to be mounted to wall using a metal hanging bracket. Station shall hold a minimum of 15 minutes of eyewash solution. Solution shall flow by gravity and the nozzle strap shall be easily removable for quick access. Provide a quantity of concentrate to make 15 gallons of eyewash solution and an instructional booklet for the unit.

9. Electric Heater: 1500 watt, 230 volt electric wall-mounted heater with integral adjustable thermostat.

10. Exhaust Fan: 520 scfm rated with gravity shutter, fiberglass canopy and insert screen, with exterior and interior mounted control switches.

11. Thermostat: Provide an adjustable thermostat, mounted to the wall, wired to the exhaust fan for automatic control.

12. Intake Louver: Provide fiberglass intake louver with gravity shutter and insect screen, sized for a free area adequate for specified exhaust fan.

13. Receptacles: Provide three (3) duplex electrical receptacles at locations shown on the drawings.

14. Light: 48" vaportight, 2-lamp, T-8 fluorescent light.

15. Duplex switch box: Provide one (1) interior 2 toggle duplex switch box to control the light and the exhaust fan.

16. Panelboard: Provide 120/240 V, 1-phase, 3-wire, 100 A, 12 space paneboard with 50 A, 2-pole main breaker.

17. Chemical Feed Pump Contactor: Provide electrical contactor for switching dedicated 20 A, 120 VAC circuit to chemical feed pump receptacle. Contactor shall have 120 VAC operating coil.

2.10 CHEMICAL FEED SYSTEM FOR ODOR CONTROL

A. Odor Control Chemical:

1. The chemical shall be specifically manufactured to control hydrogen sulfide in municipal wastewater collection systems.

2. The chemical shall be non-hazardous and shall not require special handling and/or transportation.

3. The chemical shall not require dilution with water.

4. The chemical shall be Bioxide as manufactured by Siemens Water Technologies, Econox as manufactured by Carus Corporation, Ni-tra-Nox as manufactured by Aulick Chemical Solutions or an Engineer approved equal. Note that the above cited examples are used only to denote the quality standard of product desired and to convey to bidders the general style, type, character and quality of product desired. Bidders are not restricted to a specific brand, make, manufacturer or specific name; equivalent products, as determined by the Engineer, will be acceptable.

B. Chemical Storage:

1. The Contractor shall provide four (4) 55-gallon drums suitable for storage of odor control chemicals, complete with odor control chemical.

2. Storage containers shall be suitable for both inside and outside use.

C. Chemical Metering Pumps:

1. Two (2) pumps shall be supplied, and shall be the hydraulically actuated diaphragm type using hydraulic fluid to deflect a flat conical or tubular diaphragm, delivered by non-packed piston. The pumps shall be self-priming and capable of indefinite operation without adding process fluid. One pump will normally be in operation. The second pump is a back-up for reliability.

2. Adjustment shall be manual, using stoke length or speed adjustment. Adjustment accuracy shall be 1% over a 0% to 100% of the pump maximum rated capacity.

3. The pumps shall be capable of delivering __0__ to __1__ gallon per hour (gph) at no more than 95 strokes per minute. Drives shall be the standard foot mounted motor.

4. All suction and discharge piping shall be ½" diameter NPT Schedule 80 PVC. All valves, fittings and connectors shall be 2" diameter Schedule 80 PVC.

5. All chemical feed seals shall be compatible with the chemicals to be used in the regular operation, maintenance and cleaning of the chemical feed system.

4. Pump head shall be the manufacturers standard.

5. The pump shall have disconnect couplings, on inlet and outlet and be equipped with an anti-siphon device.

6. The pump shall be equipped with automatic pressure relief and air release valve.

7. The pump shall be equipped with automatic compensator valve to replace oil leakage past the piston from the oil reservoir.

10. A calibration column shall be included for feed rate calibration.

11. Materials of Construction: Materials of construction may be any of the following:

Part	Material
Conical or Tubular	Hypalon, Viton or EPDM
Other Wetted Parts	PVC, Kynar, Viton, Ceramic, Glass, 316SS, 304SS, Hastelloy C, Monel
Base Plate and Housing	Manufacturer's Standard

D. Chemical Metering Pump Controls:

1. Control of metering pumps will be through the automatic energizing of the plug-in power receptacle, which will be energized by the contactor when one or two of the sewage pumps are in operation. .

2. Timing controls shall be provided integral to each metering pump for adjustment of chemical feeding and mixing cycles. Changing of the feed rate shall be accomplished manually with a timer calibrated at 3-100 percent of capacity. The timer shall be conveniently located on the front of the feeder along with a power ON/OFF switch and an ON light. An external relay switch shall be provided for start-stop control of the feeder system at the main control panel.

E. Chemical Feed Pump Accessories: The manufacturer shall furnish the accessories listed below with the chemical metering pump system.

All accessories which will contact the chemical being delivered shall be suitable for that specific purpose.

QUANTITY	ITEM
	Steel Pump Support Brackets Suitable For Wall Mounting
	1000 cc Calibration Chamber
	1/2" Pulsation Dampener
	1/2" Pressure Relief Valve
	1/2" Backpressure Valve (if not integral to Pump)
	1/2" Ball Valves
	1" Ball Valves
	2" Ball Valves
	1/2" Ball Check Valves (True Union)
As Required	1/2" Flexible Pipe Connectors for Pump(s) Suction and Discharge

F. CONCRETE

The reinforced concrete foundation for the fiberglass odor control building shall be constructed in accordance with the following specifications.

1. Reinforcing: Bar reinforcement shall be intermediate grade new billet steel conforming to the requirements of ASTM A-615. Unless otherwise noted, all reinforcing bars shall be grade 60. Wire fabric reinforcement shall consist of steel wire conforming to the requirements of ASTM A-185, latest revision.

2. Concrete: All concrete shall be equivalent to ready mix concrete manufactured and delivered in accordance with the requirements of ASTM C-94, latest revision and having a compressive strength at 28 days of 4000 psi, except as noted herein. The concrete manufacturer shall assume the responsibility of the design of the concrete mix in accordance with Alternate No. 2 of ASTM C-94. Air entrained concrete shall be used for all concrete exposed to the elements.

   a. Cement shall be Type 1 or Type 1A "Portland" cement conforming to ASTM C-150, latest revision or ASTM C-175, latest revision respectively.

   b. Aggregates shall conform to ASTM C-33, latest revision. Coarse aggregate shall be crushed rock or gravel and graded from 3/4" to #4 sieve for walls and slabs and from 2" to #4 sieve for mass or foundation concrete. Fine aggregate shall be natural sand.

   c. Mixing water shall be proportioned so that slump when measured with standard slump cone does not exceed the following:

      i. Slabs in grade ..... Max. 4", Min. 3"
      ii. Footings..... Max. 5", Min. 3"
      iii. All others ..... Max. 6", Min. 3"

   d. Premolded joint filler strips shall be resilient compressive, bituminous and fiber material saturated, with at least 35% and not over 50% by weight of asphalt. Poured type joint composition for expansion joints shall be elastic compound made up of asphalt and colloidal mineral fillers.

2.11 ELECTRICAL

A. All electrical work for the Southbound Sewer Pump Station is included in the lump sum.pay item, and includes all electrical work, including electrical panels, at the pump station and between the pump station and the power feed panel in the detached rest area building shown on the Drawings. Also included in this pay item is all electrical work associated with the prefabricated fiberglass odor control buiding, including all work inside and outside the building, and between the odor control building and the power feed panel in the detached rest area building shown on the Drawings.

Electrical work is to be furnished and performed in accordance with the specification sections referenced previously in this Section.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation and filling are specified in other Sections. However, all earthwork associated with the Southbound Sewer Pump Station is included in the lump sum pay item for the pump station.

3.2 INSTALLATION

A. All equipment and materials shall be installed in a neat, workmanlike manner in strict accordance with the manufacturer's recommendations and all applicable requirements of agencies having jurisdiction.

B. Pumps, piping, valves and other equipment shall be erected and installed by competent, skilled mechanics at the exact positions and elevations shown on the Plans.

C. All equipment and connecting piping shall be installed and supported in such manner that no load from the piping will be carried by the pumps.

D. Fencing:

1. Posts: Each post shall be set plumb in a foundation of 2,500 psi concrete having a minimum diameter of 9" or three times the diameter of the post and at least 36" deep. Line posts shall be evenly spaced 10'-0" or less apart, true to line.

2. Top rail shall pass through line post tops to form a continuous brace within each stretch of fence and securely fastened to terminal posts. End, corner, pull and gate post trussed to line posts with 3/8" rods and tighteners.

3. Fabric: Fabric shall be connected to line posts with 6-gauge wire clips 14" on center; to top rails with 9-gauge wires 24" on center; to terminal, corner and gate posts by integrally weaving into the post or by using 3/4" by 1/4" tension bars fastened to the post by 11-gauge x 1" wide steel bands and 3/8" bolts and nuts spaced 14" on center.

4. Slats: PVC privacy slats shall be installed in accordance with the fence manufacturer's recommendations to provide 75% privacy blockage.

3.3 CONCRETE

A. Forms shall be wood, metal, structural hardboard or other suitable material that will produce the required surface finish. Forms placed for successive pours for continuous surfaces shall be fitted to accurate alignment to assure a smooth completed surface free from irregularities, and shall be sufficiently tight to prevent the loss of mortar. No forms shall be left permanently in place without approval of the Engineer. Holes resulting from removal of form ties shall be filled solid within 12 hours after removal of forms with cement mortar.

B. Concrete shall be placed as nearly as possible in its final position. Runways for wheeled equipment shall not be supported on the reinforcement. Concrete shall be placed and compacted in layers not over 18 inches deep. Vibrators may be used provided they are used under experienced supervision and the mixture is dry enough to prevent segregation. Form vibrators shall not be used. Vibration shall not be used for transporting or moving concrete inside the forms. No more concrete shall be placed than can be consolidated and finished the same day as placed. Free fall of concrete shall be limited so that no segregation of materials occurs.

C. Construction of joints not indicated on drawing shall be approved by the Engineer in advance of pour. Joints in foundation walls shall be keyed. Before depositing of concrete is resumed, the hardened surface shall be roughened, cleaned and wetted surfaces shall be slushed with a coating of neat cement grout against which the new concrete shall be placed before the new grout has attained its set.

D. After stripping forms, all voids and honeycombs shall be patched by chipping and scarifying the defective area and treating it with an approved bonding tended that all such voids be patched, not merely plastered. Grout mixture shall consist of one part Portland cement and one part sand. Immediately following removal of forms, all fins and irregular projections shall be removed from all surfaces except from those which are not to be exposed or waterproofed.

E. Slabs shall be struck off and consolidated by approved machine or hand methods, so that upon completion, the surface shall be true to grade as shown on drawings and free of surface voids. All floors shall have

monolithic steel trowel finish unless otherwise indicated on the drawings. Exterior walks shall be compacted, screeded and floated to a true even surface with wood floats and then broomed.

3.4 QUALITY CONTROL AND FIELD TESTING

A. Sewage Pumps: The Contractor shall furnish the services of a factory-authorized technical representative for one (1) full day at the job site to inspect, test, adjust components, assemblies, and equipment installations, and provide start-up and operator training. The technical representative shall be responsible to ensure that all pumps, motors, equipment, controls, alarms, wiring and all associated components are properly installed and functioning properly.

B. Chemical Metering Pumps: The Contractor shall furnish the services of a factory-authorized technical representative for one (1) full day at the job site to inspect, test, adjust components, assemblies, and equipment installations, and provide start-up and operator training. The technical representative shall be responsible to ensure that all pumps, motors, equipment, controls, alarms, wiring and all associated components are properly installed and functioning properly.

C. Field Testing:

1. The Contractor shall notify the Engineer that all or portions of the work are ready for testing. All testing shall be scheduled with the Engineer, who will coordinate with the Owner, and respond to the Contractor regarding a mutually available date and time for the necessary testing. All testing shall be done in the presence of the Engineer. All labor, equipment, water and other materials, including meters and gauges, shall be furnished by the Contractor at his own expense.
2. Each pump shall be field tested, as described below, by the manufacturer's technical representative to demonstrate that the pump performance meets the requirements of the drawings and specifications. The manufacturer shall provide and install any gauges, meters or other devices needed for the field tests.
3. The Contractor shall furnish all necessary oil, grease and other materials and supplies for the operation of the equipment during the initial trial operation.
4. Pump start up and testing shall be done in the presence of the Engineer and shall demonstrate conformance to the conditions shown on the contract drawings.

D. After installation, but prior to backfill around the station, the wet well shall be filled with clean water and allowed to stand for 24 hours (minimum) after which the water level shall be measured to determine if leakage has occurred. If leaking is noted, the wet well shall be drained, the leakage repaired, and the test repeated. After satisfactory completion of the hydrostatic test of the wet well, a drawdown test and start-up shall be performed. A factory representative shall be on site for this test. Each pump shall be run through 3 drawdown cycles, measuring drawdown and timing the run to compute pumping rate. Clean water shall be used for the drawdown test. The controls shall be checked for operation in the automatic and manual operation modes. The level control system shall be checked for proper elevations and operation. The telemetry system and alarms shall be programmed and checked for proper operation.

E. Pumps and controls will be considered defective if they do not pass tests and inspections.

F. The factory-authorized technical representative shall prepare and submit three copies of all necessary test results and inspection reports.

G. Adjust pumps to function smoothly, and lubricate as recommended by manufacturer.

H. Adjust control set points and other features as necessary for proper performance.

3.5 DEMONSTRATION OF ACCEPTABLE PERFORMANCE

A. All equipment associated with this specification shall be subject to a minimum 30 day performance trial period. After start-up, but prior to acceptance by the Owner, the equipment shall operate within the specified parameters requiring only routine operations and normal maintenance. If, at any time during this trial period, the equipment fails to perform as required by this specification, the Contractor shall be required to make the necessary repairs, modifications or adjustments to this equipment to allow it to operate as specified. These modifications shall be accomplished within 30 days of notification by the Owner to the Contractor. The Contractor shall be responsible for any damages suffered by the Owner, either direct or indirect, resulting from the failure of this equipment to perform as specified at any time prior to acceptance. After the necessary equipment adjustments/modifications have been completed, a new 30 day performance trial period shall begin. If, at any time during this second trial period, the equipment, again, fails to perform as required by this specification, the Owner may elect to either have the equipment replaced at the expense of the Contractor or have the cost of this equipment refunded as

indicated in the Schedule of Values established for this project. After satisfactory performance of the equipment during the indicated performance trail period, the Owner will issue a written acceptance of the equipment and the warranty period shall be established.

3.6 SPARE PARTS

A. The Contractor shall furnish one (1) complete set of spare parts as detailed below for each pump supplied on this contract. Spare parts shall be conveyed to the Owner.

Upper and Lower Mechanical Seal	Shredding Ring
Motor Cable	Cable Entry Washer
Cable Grommet	O-Ring Kit
Inspection Plug Washer	Grinder Impeller
Upper Bearing	Impeller Key
Lower Bearing	Impeller Bolt

PART 4 – MEASUREMENT AND PAYMENT

A. The Southbound Sewer Pump Station will be measured and paid as a single lump sum amount to include furnishing all equipment, materials, labor and other appurtenances necessary for a complete and fully functional installation as described on the project drawings and as specified herein, including, but not limited to, the pump station wetwell and integral valve vault, concrete foundation for wetwell, stone subbase beneath the wetwell foundation, all electrical work between the pump station and the electrical power panel inside the rest area building, all electrical panels at the pump station, excavation, backfill, and all related site work including rock excavation, pumps and accessories and equipment start-up services, all piping, fitting, valves and related ancillary items inside the structures and outside the structures which are within the limits of the fencing, including furnishing and installation of the 3-inch plug valve and boxes outside the valve vault as show on the Drawings. Also included in this item is fencing, gravel drive and gravel inside the fence, prefabricated fiberglass odor control building, including, but not limited to, metering pumps, chemical tanks filled with specified odor control chemical, building heater, fan, all electrical, and other building components as described on the Drawings.

B. This item shall be paid for at the lump sum price bid for the item. This price shall include complete system installation, startup and testing. Final payment for this item will only occur after acceptance of this item by the Owner.

END OF SECTION

SECTION 16010 BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 GENERAL

A. This section covers procedural requirements and is applicable to all Division 16 specifications. The requirements in this section supplement the requirements found in the General and Supplementary Conditions and Division 1 Specification Sections. The requirements in the General and Supplementary Conditions and Division 1 Specification Sections take precedence regarding any direct conflicts that may exist between this section and the General and Supplementary Conditions and Division 1 Specification Sections. In cases of duplication of or similar requirements between this section and the General and Supplementary Conditions and Division 1 Specification Sections, the most restrictive requirement applies.

B. Division 16 Specification Format: The Division 16 Specifications are organized into Divisions and Sections using the 16-division format.

1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

C. Division 16 Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be

interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

   a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

D. The words "Design Consultant," "Designer," "Architect," and "Engineer" may be used interchangeably throughout these specifications and refers to the design professional of record for the applicable portion of the project.

E. This Section includes requirements related to the following:

1. Administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

1.03 DEFINITIONS

A. Approved: When used to convey Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Engineer's duties and responsibilities as stated in the Conditions of the Contract.

B. Directed: A command or instruction by Engineer. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."

C. Indicated: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

D. Regulations: Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

E. Furnish: Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

F. Install: Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

G. Provide: Furnish and install, complete and ready for the intended use.

H. Installer: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.

I. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

J. Project Site: Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

K. Action Submittals: Written and graphic information that requires Engineer's responsive action.

1.04 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

C. Conflicting Requirements: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Engineer for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.

E. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the industry recognized name of the standards and regulations.

1.05 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. State Government Agencies and Code References: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities or documents in the following list.

1. NCDoI - North Carolina Department of Insurance.
2. NCSBC - North Carolina State Building Code.

1.06 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

   a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
2. If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Allow 15 days for processing each resubmittal.
4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

C. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.

2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.

3. Include the following information on label for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name and address of Engineer.
   d. Name and address of Contractor.
   e. Name and address of subcontractor.
   f. Name and address of supplier.
   g. Name of manufacturer.
   h. Unique identifier, including revision number.
   i. Number and title of appropriate Specification Section.
   j. Drawing number and detail references, as appropriate.
   k. Other necessary identification.

D. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

E. Additional Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.

1. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will discard submittals received from sources other than Contractor.

   a. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

F. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

G. Use for Construction: Use only final submittals with mark indicating action taken by Engineer in connection with construction.

PART 2 - PRODUCTS

2.01 SUBMITTALS

A. ACTION SUBMITTALS

1. General: Prepare and submit Action Submittals required by individual Specification Sections.

   a. Number of Copies: Submit five copies of each submittal, unless otherwise indicated. Engineer will return three copies. Mark up and retain one returned copy as a Project Record Document.

2. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

   a. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
   b. Mark each copy of each submittal to show which products and options are applicable.
   c. Include the following information, as applicable:
      1) Manufacturer's written recommendations.
      2) Manufacturer's product specifications.
      3) Manufacturer's installation instructions.
      4) Manufacturer's catalog cuts.
      5) Wiring diagrams showing factory-installed wiring.
      6) Printed performance curves.
      7) Operational range diagrams.
      8) Compliance with recognized trade association standards.
      9) Compliance with recognized testing agency standards.

3. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

   a. Preparation: Include the following information, as applicable:
      1) Dimensions.
      2) Identification of products.
      3) Fabrication and installation drawings.
      4) Roughing-in and setting diagrams.
      5) Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
      6) Shopwork manufacturing instructions.
      7) Templates and patterns.
      8) Schedules.
      9) Notation of coordination requirements.

10) Notation of dimensions established by field measurement.

b. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

c. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.

PART 3 - EXECUTION

3.01 SUBMITTALS

A. CONTRACTOR'S REVIEW

1. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
2. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

B. ENGINEER'S ACTION

1. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.

2. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

a. Final Unrestricted Release: Where submittal is marked "Approved," the Work covered by the submittal may proceed provided it complies with the Contract Documents. Final acceptance will depend on that compliance.

b. Final-but-Restricted Release: Where the submittal is marked "Approved as Noted," the Work covered by the submittal may proceed provided it complies with both Engineer's notations and corrections on the submittal and the Contract

Documents. Final acceptance will depend on that compliance.

c. Returned for Resubmittal: Where the submittal is marked "Revise and Resubmit," do not proceed with the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity for the product submitted. Revise or prepare a new submittal according to Engineer's notations and corrections.

d. Rejected: Where the submittal is marked "Not Approved" do not proceed with the Work covered by the submittal. Prepare a new submittal for a product that complies with the Contract Documents.

3. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION

SECTION 16050 BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. General coordination.
2. Cutting and patching for electrical construction.
3. Touchup painting.

1.03 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 NFPA 70.

1.04 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

PART 2 - PRODUCTS

2.01 TOUCHUP PAINT

A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.01 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.02 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.03 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:

1. Cutting and patching for electrical construction.
2. Touchup painting.

3.04 REFINISHING AND TOUCHUP PAINTING

A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."

3.05 CLEANING AND PROTECTION

A. On completion of installation inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 16060 GROUNDING AND BONDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes: Grounding systems and equipment.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:

1. Ground rods.

C. Field quality-control reports.

1.04 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.01 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
4. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.02 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.03 GROUNDING ELECTRODES

A. Ground Rods: steel; 3/4 inch by 10 feet in diameter.

PART 3 - EXECUTION

3.01 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install barecopper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.

3.02 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

3.03 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

3.04 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports.

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

B. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 16073 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.03 DEFINITIONS

A. IMC: Intermediate metal conduit.

B. RMC: Rigid metal conduit.

1.04 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.05 SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.
2. Equipment supports.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.07 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

PART 2 - PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

2. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.

3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.

4. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.01 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slottedsupport system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.02 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, IMC and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.

2. To New Concrete: Bolt to concrete inserts.

3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.

4. To Existing Concrete: Expansion anchor fasteners.

5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.

6. To Light Steel: Sheet metal screws.

7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.03 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 3 Section "Cast-in-Place Concrete."

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

2. Install anchor bolts to elevations required for proper attachment to supported equipment.

3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.04 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 16075 ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Identification of power and control cables.
2. Identification for conductors.
3. Underground-line warning tape.
4. Warning labels and signs.
5. Instruction signs.
6. Equipment identification labels.
7. Miscellaneous identification products.

1.03 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.04 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

1.05 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings,

Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

PART 2 - PRODUCTS

2.01 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.02 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

2.03 FLOOR MARKING TAPE

A. 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.04 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.

2. Printing on tape shall be permanent and shall not be damaged by burial operations.

3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.

2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE,.

3. Inscriptions for Orange-Colored Tapes: CONTROL CABLE, COMMUNICATIONS CABLE.

C. Power Circuits:

1. Multilayer laminate consisting of high-density polyethylene scrim coated with pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.

2. Thickness: 12 mils.

3. Weight: 36.1 lb/1000 sq. ft.

4. 3-Inch Tensile According to ASTM D 882: 400 lbf, and 11,500 psi.

D. Communications and Control Cable:

1. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective

film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.

2. Overall Thickness: 8 mils.

3. Foil Core Thickness: 0.35 mil.

4. Weight: 34 lb/1000 sq. ft.

5. 3-Inch Tensile According to ASTM D 882: 300 lbf, and 12,500 psi.

2.05 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.

2. 1/4-inch grommets in corners for mounting.

3. Nominal size, 7 by 10 inches.

C. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.

2. 1/4-inch grommets in corners for mounting.

3. Nominal size, 10 by 14 inches.

D. Warning label and sign shall include, but are not limited to, the following legends:

1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.06 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.

2. Punched or drilled for mechanical fasteners.

3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.07 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

2.08 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.

2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.

3. Temperature Range: Minus 40 to plus 185 deg F.

4. Color: Black except where used for color-coding.

B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.

2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.

3. Temperature Range: Minus 40 to plus 185 deg F.

4. Color: Black.

2.09 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 9 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

G. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.

H. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

I. Painted Identification: Comply with requirements in Division 9 painting Sections for surface preparation and paint application.

3.02 IDENTIFICATION SCHEDULE

A. Accessible Raceways 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label. Install labels at 30-foot maximum intervals.

B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.

b. Colors for 120/240-V, Single Phase Circuits:

1) Line L1: Black.
2) Line L2: Red

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

D. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

E. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

F. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

G. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Metal-backed, butyrate warning signs.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

   a. Controls with external control power connections.

I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.

K. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

   a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.

b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.

2. Equipment to Be Labeled:

a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.

b. Enclosed switches.

c. Enclosed circuit breakers.

END OF SECTION

SECTION 16120 CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

1.04 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 NFPA 70.

PART 2 - PRODUCTS

2.01 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70.

B. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW.

2.02 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.01 CONDUCTOR INSULATION APPLICATIONS AND WIRING METHODS

A. Outdoor and Underground: Type XHHW, single conductors in raceway.

B. Class 1 Control Circuits: Type THHN-THWN, in raceway.

C. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.02 INSTALLATION OF CONDUCTORS AND CABLES

A. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

B. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

C. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

D. Identify and color-code conductors and cables according to Section 16075 "Electrical Identification."

3.03 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

3.04 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test conductors for compliance with requirements.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.

2. Test results that comply with requirements.

3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION

SECTION 16123 CONTROL-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Control-circuit conductors.
2. Identification products.

1.03 DEFINITIONS

A. EMI: Electromagnetic interference.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Source quality-control reports.

C. Field quality-control reports.

D. Maintenance Data: For wire and cable to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 2 - PRODUCTS

2.01 CONTROL-CIRCUIT CONDUCTORS

A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway, complying with UL 83.

B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway, complying with UL 83.

C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or Type TF, complying with UL 83.

2.02 IDENTIFICATION PRODUCTS

A. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Comply with requirements in Section 16075 "Electrical Identification."

PART 3 - EXECUTION

3.01 INSTALLATION OF RACEWAYS

A. Comply with requirements in Section 16130 "Raceways and Boxes" for installation of conduits and wireways.

3.02 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

3.03 REMOVAL OF CONDUCTORS AND CABLES

A. Remove abandoned conductors and cables.

3.04 CONTROL-CIRCUIT CONDUCTORS

A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No 14 AWG.

2. Class 2 low-energy, remote-control, and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm, and signal circuits, No 12 AWG.

3.05 IDENTIFICATION

A. Comply with requirements for identification specified in Section 16075 "Electrical Identification."

END OF SECTION

SECTION 16130 RACEWAYS AND BOXES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.02 DEFINITIONS

A. LFMC: Liquidtight flexible metal conduit.

B. RNC: Rigid nonmetallic conduit.

1.03 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Source quality-control test reports.

1.04 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 NFPA 70.

PART 2 - PRODUCTS

2.01 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. LFMC: Flexible steel conduit with PVC jacket.

C. Fittings for Conduit (Including all Types and Liquidtight): NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

D. Joint Compound for Rigid Steel Conduit: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.02 NONMETALLIC CONDUIT AND TUBING

A. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.

B. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.

2.03 METAL WIREWAYS

A. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 3R, unless otherwise indicated.

B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

C. Wireway Covers: Screw-cover type.

D. Finish: Manufacturer's standard enamel finish.

2.04 BOXES, ENCLOSURES, AND CABINETS

A. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

B. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized, cast iron with gasketed cover.

C. Hinged-Cover Enclosures: NEMA 250, Type 3R, with continuous-hinge cover with flush latch, unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

D. Cabinets:

1. NEMA 250, Type 3R, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.

2. Hinged door in front cover with flush latch and concealed hinge.

3. Key latch to match panelboards.

4. Metal barriers to separate wiring of different systems and voltage.

PART 3 - EXECUTION

3.01 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid Steel Conduit.

2. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.

3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Minimum Raceway Size: 3/4-inch trade size.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.02 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Complete raceway installation before starting conductor installation.

C. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

D. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

E. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

F. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

G. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC

3.03 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 2 Section "Earthwork" for pipe less than 6 inches in nominal diameter.

2. Install backfill as specified in Division 2 Section "Earthwork."

3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 2 Section "Earthwork."

4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.

b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge

of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.04 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 16140 WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Snap switches.

1.03 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.
B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

C. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

B. 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.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.02 GFCI RECEPTACLES

A. General Description: Straight blade, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. Cooper; GF20.
   b. Pass & Seymour; 2084.
   c. Leviton;

2.03 SNAP SWITCHES

A. Comply with NEMA WD 1 and UL 20.

B. Switches, 120/277 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. Cooper; 2221 (single pole).
   b. Hubbell; CS1221 (single pole).
   c. Leviton; 1221-2 (single pole).
   d. Pass & Seymour; 20AC1 (single pole).

2.04 WALL PLATES

A. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant , die-cast aluminum with lockable cover.

2.05 FINISHES

A. Color: Wiring device catalog numbers in Section Text do not designate device color.
   1. Wiring Devices Connected to Normal Power System: Gray, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Conductors:
   1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
   2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
   3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

C. Device Installation:
   1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
   2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.

3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

D. Receptacle Orientation:
1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.

E. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.02 IDENTIFICATION

A. Comply with Section 16075 "Electrical Identification."

3.03 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.

END OF SECTION

SECTION 16289 SURGE-PROTECTIVE DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes field-mounted SPD for low-voltage (120 to 600 V) power distribution and control equipment.

1.03 DEFINITIONS

A. ATS: Acceptance Testing Specifications.

B. SVR: Suppressed voltage rating.

C. SPD: Surge-Protective Device.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating weights, electrical characteristics, furnished specialties, and accessories.

B. Product Certificates: For SPD devices, from manufacturer.

C. Operation and Maintenance Data: For SPD devices to include in emergency, operation, and maintenance manuals.

D. Warranties: Sample of special warranties.

1.05 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.

B. Comply with IEEE C62.41.2 and test devices according to IEEE C62.45.

C. Comply with NEMA LS 1.

D. Comply with UL 1449, 3rd Edition.

E. Comply with NFPA 70.

1.06 PROJECT CONDITIONS

A. Service Conditions: Rate SPD devices for continuous operation under the following conditions unless otherwise indicated:

1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.

2. Operating Temperature: 30 to 120 deg F.

3. Humidity: 0 to 85 percent, noncondensing.

4. Altitude: Less than 20,000 feet above sea level.

1.07 COORDINATION

A. Coordinate location of field-mounted SPD devices to allow adequate clearances for maintenance.

1.08 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Ten (10) years from date of Substantial Completion.

1.09 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Replaceable Protection Modules: One of each size and type installed.

PART 2 - PRODUCTS

2.01 SERVICE ENTRANCE SUPPRESSORS

A. Surge-Protection Devices:

1. Comply with UL 1449, 3rd Edition.
2. Modular design (with field-replaceable modules).
3. Provide with integral disconnect.
4. Short-circuit current rating complying with UL 1449, and matching or exceeding the panelboard short-circuit rating and redundant suppression circuits; with individually fused metal-oxide varistors.
5. Fabrication using bolted compression lugs for internal wiring.
6. Redundant suppression circuits.
7. Redundant replaceable modules.
8. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
9. LED indicator lights for power and protection status.
10. Audible alarm, with silencing switch, to indicate when protection has failed.
11. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
12. Four-digit transient-event counter set to totalize transient surges.

B. Peak Single-Impulse Surge Current Rating: 120 kA per mode/240 kA per phase.

C. Minimum single impulse current ratings, using 8-by-20-mic.sec waveform described in IEEE C62.41.2:

1. Line to Neutral: 70,000 A.

2. Line to Ground: 70,000 A.

3. Neutral to Ground: 50,000 A.

D. Protection modes and UL 1449 3rd Edition SVR for 240/120-V, 1-phase, 3-wire circuits shall be as follows:

1. Line to Neutral: 400 V.

2. Line to Ground: 400 V.

3. Neutral to Ground: 400 V.

2.02 ENCLOSURES

A. Outdoor Enclosures: NEMA 250, Type 4X.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install SPD devices at service entrance on load side, with ground lead bonded to service entrance ground.

3.02 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.

2. After installing SPD devices but before electrical circuitry has been energized, test for compliance with requirements.

3. Complete startup checks according to manufacturer's written instructions.

B. SPD device will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.03 STARTUP SERVICE

A. Do not energize or connect service entrance equipment to their sources until SPD devices are installed and connected.

B. Do not perform insulation resistance tests of the distribution wiring equipment with the SPD installed. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.

3.04 DEMONSTRATION

A. Train Owner's maintenance personnel to maintain SPD devices.

END OF SECTION

SECTION 16410 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Enclosed Circuit Breakers.
2. Nonfusible switches.
3. Enclosures.

1.03 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.04 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).

4. Include evidence of NRTL listing for series rating of installed devices.

5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NFPA 70.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.

2. Altitude: Not exceeding 6600 feet.

1.07 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.01 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.

2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.

2.02 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.

4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.

3. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.

4. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.03 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Outdoor Locations: NEMA 250, 3R.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Comply with NECA 1.

3.03 IDENTIFICATION

A. Comply with requirements in Section 16075 "Electrical Identification."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.

2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.04 FIELD QUALITY CONTROL

A. Perform the Following Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

B. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.05 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION

SECTION 16442 PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:

1. Lighting and appliance branch-circuit panelboards.

1.03 SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.

2. Detail enclosure types and details for types other than NEMA 250, Type 1.

3. Detail bus configuration, current, and voltage ratings.

4. Short-circuit current rating of panelboards and overcurrent protective devices.

5. Include evidence of NRTL listing for series rating of installed devices.

6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

7. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on

translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

C. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA PB 1.

D. Comply with NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.06 PROJECT CONDITIONS

A. Environmental Limitations:

1. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

a. Ambient Temperature: Not exceeding minus 22 deg F to plus 104 deg F.

b. Altitude: Not exceeding 6600 feet.

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.

2. Altitude not exceeding 6600 feet.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Surface-mounted cabinets. Type as shown on drawings.

1. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

2. Finishes:

a. Panels and Trim: Steel and galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.

3. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.

B. Incoming Mains Location: Top or bottom as required.

C. Phase, Neutral, and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.

2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

D. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.

2. Main and Neutral Lugs: Mechanical type.

3. Ground Lugs and Bus-Configured Terminators: Compression type.

E. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.

F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

G. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.02 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only as shown on drawings.

D. Branch Overcurrent Protective Devices: Bolt-in circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.03 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.

2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.

3. Siemens Energy & Automation, Inc.

4. Square D; a brand of Schneider Electric.

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with series-connected rating to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

a. Standard frame sizes, trip ratings, and number of poles.

b. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.

c. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.

d. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in off position.

e. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

C. Install filler plates in unused spaces.

D. Comply with NECA 1.

3.03 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 16075 "Electrical Identification."

B. Create a directory to indicate installed circuit loads. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 16075 "Electrical Identification."

END OF SECTION

PROJECT SPECIAL PROVISION

(10-18-95) (Rev. 2-18-14) Z-1

PERMITS

The Contractor's attention is directed to the following permits, which have been issued to the Department of Transportation by the authority granting the permit.

PERMIT	AUTHORITY GRANTING THE PERMIT
Dredge and Fill and/or Work in Navigable Waters (404)	U. S. Army Corps of Engineers
Water Quality (401)	Division of Environmental Management, DENR State of North Carolina
Trout Buffer Zone Waiver	Department of Energy, Mineral, and Land Resources, DENR, State of North Carolina

The Contractor shall comply with all applicable permit conditions during construction of this project. Those conditions marked by * are the responsibility of the Department and the Contractor has no responsibility in accomplishing those conditions.

Agents of the permitting authority will periodically inspect the project for adherence to the permits.

The Contractor's attention is also directed to Articles 107-10 and 107-13 of the *2012 Standard Specifications* and the following:

Should the Contractor propose to utilize construction methods (such as temporary structures or fill in waters and/or wetlands for haul roads, work platforms, cofferdams, etc.) not specifically identified in the permit (individual, general, or nationwide) authorizing the project it shall be the Contractor's responsibility to coordinate with the Engineer to determine what, if any, additional permit action is required. The Contractor shall also be responsible for initiating the request for the authorization of such construction method by the permitting agency. The request shall be submitted through the Engineer. The Contractor shall not utilize the construction method until it is approved by the permitting agency. The request normally takes approximately 60 days to process; however, no extensions of time or additional compensation will be granted for delays resulting from the Contractor's request for approval of construction methods not specifically identified in the permit.

Where construction moratoriums are contained in a permit condition which restricts the Contractor's activities to certain times of the year, those moratoriums will apply only to the portions of the work taking place in the waters or wetlands provided that activities outside those areas is done in such a manner as to not affect the waters or wetlands.

R-2

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID. **2013-00402** County: **Haywood**

GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

Property Owner / Authorized Agent: **North Carolina Department of Transportation**
Attn: Dr. Gregory Thorpe
Address: **1598 Mail Service Center**
Raleigh,North Carolina 27699-1598
Telephone No.: **919-707-6126**

Size and location of property (water body, road name/number, town, etc.): **The project is located on an unnamed tributary (UT) to Richland Creek along US 23/74 near Waynesville, Haywood County, North Carolina.**

Description of projects area and activity: **In order to construct a southbound rest area on US 23/74, the permittee is authorized to impact waters of the U.S. (UT to Richland Creek) as follows: (1) permanently impact (extend culvert) 39 linear feet (lf) of stream; (2) permanently impact (bank stabilization) 15 lf of stream, and; (3) temporarily impact (dewater) 13 lf of stream.**

Applicable Law: ☒ Section 404 (Clean Water Act, 33 USC 1344)
☐ Section 10 (Rivers and Harbors Act, 33 USC 403)
Authorization: Regional General Permit Number:
Nationwide Permit Number: **13, 23, and 33**

Your work is authorized by the above referenced permit provided it is accomplished in strict accordance with the attached conditions, your submitted plans, and the following special conditions:

Special Conditions

1. All work must be performed in strict compliance with the description of work and plans in the application dated January 30, 2013. Any modification to the description of work and/or the permit plans must be approved by the USACE prior to implementation.

2. In order to compensate for impacts associated with this permit, mitigation shall be provided in accordance with the provisions outlined on the most recent version of the attached Compensatory Mitigation Responsibility Transfer Form. The requirements of this form, including any special conditions listed on this form, are hereby incorporated as special conditions of this permit authorization.

3. In-stream work and land disturbance within the 25-foot trout buffer is prohibited from October 15th to April 15th of any year.

4. Sediment and erosion control measures shall adhere to design standards for sensitive watersheds.

5. The permittee shall require its contractors and/or agents to comply with the terms and conditions of this authorization letter in the construction and maintenance of this project, and shall provide each of its contractors and/or agents associated with the construction or maintenance of this project with a copy of this authorization letter, all conditions, and any authorized modifications. A copy of this authorization letter, all conditions, and any authorized modifications, shall be available at the project site during construction and maintenance of this project.

6. This permit does not authorize temporary placement or double handling of excavated or fill material within waters or wetlands outside the permitted area.

7. The permittee will report any violation of these conditions or violations of Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act in writing to the Wilmington District, U. S Army Corps of Engineers, within 24 hours of the permittee's discovery of the violation.

Any violation of the noted conditions or deviation from your submitted plans may subject the permittee to a stop work order, a restoration order and/or appropriate legal action.

This verification will remain valid until the expiration date identified below unless the nationwide authorization is modified, suspended or revoked. If, prior to the expiration date identified below, the nationwide permit authorization is reissued and/or modified, this verification will remain valid until the expiration date identified below, provided it complies with all requirements of the modified nationwide permit. If the nationwide permit authorization expires or is suspended, revoked, or is modified, such that the activity would no longer comply with the terms and conditions of the nationwide permit, activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon the nationwide permit, will remain authorized provided the activity is completed within twelve months of the date of the nationwide permit's expiration, modification or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend or revoke the authorization.

Activities subject to Section 404 (as indicated above) may also require an individual Section 401 Water Quality Certification. You should contact the NC Division of Water Quality (telephone 919-807-6300) to determine Section 401 requirements.

For activities occurring within the twenty coastal counties subject to regulation under the Coastal Area Management Act (CAMA), prior to beginning work you must contact the N.C. Division of Coastal Management.

This Department of the Army verification does not relieve the permittee of the responsibility to obtain any other required Federal, State or local approvals/permits.

If there are any questions regarding this verification, any of the conditions of the Permit, or the Corps of Engineers regulatory program, please contact Lori Beckwith at 828-271-7980.

Corps Regulatory Official: Lori Beckwith BECKWITH.LORETTA.ANN.1173452264 Digitally signed by BECKWITH.LORETTA.ANN.1173452264 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=BECKWITH.LORETTA.ANN.1173452264 Date: 2013.03.12 09:53:38 -04'00'

Date: **March 12, 2013** Expiration Date of Verification: **March 18, 2017**

Determination of Jurisdiction:

A. ☐ Based on preliminary information, there appear to be waters of the US including wetlands within the above described project area. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331).

B. ☐ There are Navigable Waters of the United States within the above described project area subject to the permit requirements of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

C. ☒ There are waters of the US and/or wetlands within the above described project area subject to the permit requirements of Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

D. ☐ The jurisdictional areas within the above described project area have been identified under a previous action. Please reference jurisdictional determination issued ___. Action ID

E. Basis of Jurisdictional Determination: The stream channel in the project area is an unnamed tributary to Richland Creek and it exhibits indicators of an ordinary high water mark and has perennial flow (RPW). Richland Creek flows to the Pigeon River (a TNW). Downstream of the Waterville Lake dam in Haywood County, the Pigeon River becomes a water of the U.S. regulated pursuant to Section 10 of the Rivers and Harbors Act of 1899. This jurisdictional determination is valid for the impact areas only.

Attention USDA Program Participants
This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

F. Appeals Information (This information applies only to approved jurisdictional determinations as indicated in B and C above).

(This information applies only to approved jurisdictional determinations as indicated in B and C above).

This correspondence constitutes an approved jurisdictional determination for the above described site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a request for appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers
South Atlantic Division
Attn: Jason Steele, Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801
Phone: (404) 562-5137

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by May 10, 2013.

It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: **Lori Beckwith** BECKWITH.LORETTA.ANN.1173452264 Digitally signed by BECKWITH.LORETTA.ANN.1173452264 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=BECKWITH.LORETTA.ANN.1173452264 Date: 2013.03.12 09:54:05 -04'00'

Issue Date: **March 12, 2013** Expiration Date: Five years from *Issue Date*

SURVEY PLATS, FIELD SKETCH, WETLAND DELINEATION FORMS, PROJECT PLANS, ETC., MUST BE ATTACHED TO THE FILE COPY OF THIS FORM, IF REQUIRED OR AVAILABLE.

Copy Furnished: Via e-mail - NCDOT Mr. Jeff Hemphill and Ms. Carla Dagnino

R-6

Permit Number:	2013-00402
Permit Type:	NW13, 23, and 33
Name of County:	Haywood
Name of Permittee:	North Carolina Department of Transportation Attn: Dr. Gregory Thorpe
Date of Issuance:	March 12, 2013
Project Manager:	Lori Beckwith

*Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

U.S. Army Corps of Engineers
Attention: CESAW-RG-A
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006

Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

_____ _____

Signature of Permittee Date

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL		
Applicant: North Carolina Department of Transportation, Attn: Dr. Gregory Thorpe	File Number: 2013-00402	Date: March 12, 2013
Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
X	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/CECW/Pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: Lori Beckwith, Project Manager USACE, Asheville Regulatory Field Office 151 Patton Ave RM 208 Asheville, NC 28801 828-271-7980	If you only have questions regarding the appeal process you may also contact: Mr. Jason Steele, Administrative Appeal Review Officer CESAD-PDO U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 10M15 Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits and approved Jurisdictional Determinations send this form to:

District Engineer, Wilmington Regulatory Division, Attn: Lori Beckwith, Project Manager, 69 Darlington Avenue, Wilmington, NC 28403.

For Permit denials and Proffered Permits send this form to:

Division Engineer, Commander, U.S. Army Engineer Division, South Atlantic, Attn: Mr. Jason Steele, Administrative Appeal Officer, CESAD-PDO, 60 Forsyth Street, Room 10M15, Atlanta, Georgia 30303-8801
Phone: (404) 562-5137

NATIONWIDE PERMIT 13
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
FINAL NOTICE OF ISSUANCE AND MODIFICATION OF NATIONWIDE PERMITS
FEDERAL REGISTER
AUTHORIZED MARCH 19, 2012

Bank Stabilization. Bank stabilization activities necessary for erosion prevention, provided the activity meets all of the following criteria:

(a) No material is placed in excess of the minimum needed for erosion protection;

(b) The activity is no more than 500 feet in length along the bank, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects;

(c) The activity will not exceed an average of one cubic yard per running foot placed along the bank below the plane of the ordinary high water mark or the high tide line, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects;

(d) The activity does not involve discharges of dredged or fill material into special aquatic sites, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in minimal adverse effects;

(e) No material is of a type, or is placed in any location, or in any manner, that will impair surface water flow into or out of any waters of the United States;

(f) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored trees and treetops may be used in low energy areas); and,

(g) The activity is not a stream channelization activity.

This NWP also authorizes temporary structures, fills, and work necessary to construct the bank stabilization activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

Invasive plant species shall not be used for bioengineering or vegetative bank stabilization.

* Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if the bank stabilization activity: (1) involves discharges into special aquatic sites; or (2) is in excess of 500 feet in length; or (3) will involve the discharge of greater than an average of one cubic yard per running foot along the bank below the plane of the ordinary high water mark or the high tide line. (See general condition 31.) (Sections 10 and 404)

NATIONWIDE PERMIT 23
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
FINAL NOTICE OF ISSUANCE AND MODIFICATION OF NATIONWIDE PERMITS
FEDERAL REGISTER
AUTHORIZED MARCH 19, 2012

Approved Categorical Exclusions. Activities undertaken, assisted, authorized, regulated, funded, or financed, in whole or in part, by another Federal agency or department where:

(a) That agency or department has determined, pursuant to the Council on Environmental Quality's implementing regulations for the National Environmental Policy Act (40 CFR part 1500 et seq.), that the activity is categorically excluded from environmental documentation, because it is included within a category of actions which neither individually nor cumulatively have a significant effect on the human environment; and

(b) The Office of the Chief of Engineers (Attn: CECW-CO) has concurred with that agency's or department's determination that the activity is categorically excluded and approved the activity for authorization under NWP 23.

The Office of the Chief of Engineers may require additional conditions, including pre-construction notification, for authorization of an agency's categorical exclusions under this NWP.

* Notification: Certain categorical exclusions approved for authorization under this NWP require the permittee to submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 31). The activities that require pre-construction notification are listed in the appropriate Regulatory Guidance Letters. (Sections 10 and 404)

Note: The agency or department may submit an application for an activity believed to be categorically excluded to the Office of the Chief of Engineers (Attn: CECW-CO). Prior to approval for authorization under this NWP of any agency's activity, the Office of the Chief of Engineers will solicit public comment. As of the date of issuance of this NWP, agencies with approved categorical exclusions are the: Bureau of Reclamation, Federal Highway Administration, and U.S. Coast Guard. Activities approved for authorization under this NWP as of the date of this notice are found in Corps Regulatory Guidance Letter 05-07, which is available at: http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits/GuidanceLetters.aspx . Any future approved categorical exclusions will be announced in Regulatory Guidance Letters and posted on this same web site.

NATIONWIDE PERMIT 33
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
FINAL NOTICE OF ISSUANCE AND MODIFICATION OF NATIONWIDE PERMITS
FEDERAL REGISTER
AUTHORIZED MARCH 19, 2012

Temporary Construction, Access, and Dewatering. Temporary structures, work, and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites, provided that the associated primary activity is authorized by the Corps of Engineers or the U.S. Coast Guard. This NWP also authorizes temporary structures, work, and discharges, including cofferdams, necessary for construction activities not otherwise subject to the Corps or U.S. Coast Guard permit requirements. Appropriate measures must be taken to maintain near normal downstream flows and to minimize flooding. Fill must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. The use of dredged material may be allowed if the district engineer determines that it will not cause more than minimal adverse effects on aquatic resources. Following completion of construction, temporary fill must be entirely removed to an area that has no waters of the United States, dredged material must be returned to its original location, and the affected areas must be restored to pre-construction elevations. The affected areas must also be revegetated, as appropriate. This permit does not authorize the use of cofferdams to dewater wetlands or other aquatic areas to change their use. Structures left in place after construction is completed require a separate section 10 permit if located in navigable waters of the United States. (See 33 CFR part 322.)

* Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 31). The pre-construction notification must include a restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions. (Sections 10 and 404)

NATIONWIDE PERMIT CONDITIONS

The following General Conditions must be followed in order for any authorization by a NWP to be valid:

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.

* (c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.noaa.gov/fisheries.html respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such "take" permits are required for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address section 106 compliance for the NWP activity, or whether additional section 106 consultation is necessary.

* (c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA

section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects on the aquatic environment.

(2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

(3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of

the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee programs, or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____

(Transferee)

_____

(Date)

* 30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

* 31. Pre-Construction Notification. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;

(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of intermittent and ephemeral stream bed, and for all NWP 48 activities that require pre-construction notification, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

D. District Engineer's Decision

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. For a linear project, this determination will include an evaluation of the individual crossings to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to intermittent or ephemeral streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51 or 52, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in minimal adverse effects. When making minimal effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. The district engineer will also consider site specific factors, such as the environmental setting in the

vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

2. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

3. If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either: (a) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (c) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period, with activity-specific

conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

FURTHER INFORMATION

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project.

DEFINITIONS

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence

of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities eligible for exemptions under Section 404(f) of the Clean Water Act are not considered when calculating the loss of waters of the United States.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of standing or

flowing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas (see 33 CFR 328.3(e)).

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands adjacent to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through

which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent

mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a wetland (i.e., water of the United States) that is inundated by tidal waters. The definitions of a wetland and tidal waters can be found at 33 CFR 328.3(b) and 33 CFR 328.3(f), respectively. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line, which is defined at 33 CFR 328.3(d).

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States. If a jurisdictional wetland is adjacent – meaning bordering, contiguous, or neighboring – to a waterbody determined to be a water of the United States under 33 CFR 328.3(a)(1)-(6), that waterbody and its adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of "waterbodies" include streams, rivers, lakes, ponds, and wetlands.

Final Regional Conditions 2012

NOTICE ABOUT WEB LINKS IN THIS DOCUMENT:
The web links (both internal to our District and any external links to collaborating agencies) in this document are valid at the time of publication. However, the Wilmington District Regulatory Program web page addresses, as with other agency web sites, may change over the timeframe of the five-year Nationwide Permit renewal cycle, in response to policy mandates or technology advances. While we will make every effort to check on the integrity of our web links and provide re-direct pages whenever possible, we ask that you report any broken links to us so we can keep the page information current and usable. We apologize in advanced for any broken links that you may encounter, and we ask that you navigate from the regulatory home page (wetlands and stream permits) of the Wilmington District Corps of Engineers, to the "Permits" section of our web site to find links for pages that cannot be found by clicking directly on the listed web link in this document.

Final 2012 Regional Conditions for Nationwide Permits (NWP) in the Wilmington District

1.0 Excluded Waters

The Corps has identified waters that will be excluded from the use of all NWP's during certain timeframes. These waters are:

1.1 Anadromous Fish Spawning Areas

Waters of the United States identified by either the North Carolina Division of Marine Fisheries (NCDMF) or the North Carolina Wildlife Resources Commission (NCWRC) as anadromous fish spawning areas are excluded during the period between February 15 and June 30, without prior written approval from NCDMF or NCWRC and the Corps.

1.2 Trout Waters Moratorium

Waters of the United States in the twenty-five designated trout counties of North Carolina are excluded during the period between October 15 and April 15 without prior written approval from the NCWRC. (See Section 2.7 for a list of the twenty-five trout counties).

1.3 Sturgeon Spawning Areas as Designated by the National Marine Fisheries Service (NMFS)

Waters of the United States designated as sturgeon spawning areas are excluded during the period between February 1 and June 30, without prior written approval from the NMFS.

* 2.0 Waters Requiring Additional Notification

The Corps has identified waters that will be subject to additional notification requirements for activities authorized by all NWP's. These waters are:

* 2.1 Western NC Counties that Drain to Designated Critical Habitat

For proposed activities within Waters of the U.S. that require a Pre-Construction Notification pursuant to General Condition 31 (PCN) and are located in the sixteen counties listed below, applicants must provide a copy of the PCN to the US Fish and Wildlife Service, 160 Zillicoa Street, Asheville, North Carolina 28801. This PCN must be sent concurrently to the US Fish and Wildlife Service and the Corps Asheville Regulatory Field Office. Please see General Condition 18 for specific notification requirements related to Federally Endangered Species and the following website for information on the location of designated critical habitat.

Counties with tributaries that drain to designated critical habitat that require notification to the Asheville US Fish and Wildlife Service: Avery, Cherokee, Forsyth, Graham, Haywood, Henderson, Jackson, Macon Mecklenburg, Mitchell, Stokes, Surry, Swain, Transylvania, Union and Yancey.

Website and office addresses for Endangered Species Act Information:

The Wilmington District has developed the following website for applicants which provides guidelines on how to review linked websites and maps in order to fulfill NWP general condition 18 requirements: http://www.saw.usace.army.mil/wetlands/ESA

Applicants who do not have internet access may contact the appropriate US Fish and Wildlife Service offices listed below or the US Army Corps of Engineers at (910) 251- 4633:

US Fish and Wildlife Service
Asheville Field Office
160 Zillicoa Street
Asheville, NC 28801
Telephone: (828) 258-3939

Asheville US Fish and Wildlife Service Office counties: All
counties west of and including Anson, Stanly, Davidson, Forsyth and Stokes Counties

US Fish and Wildlife Service
Raleigh Field Office
Post Office Box 33726
Raleigh, NC 27636-3726
Telephone: (919) 856-4520

Raleigh US Fish and Wildlife Service Office counties: all counties east of and including Richmond, Montgomery, Randolph, Guilford, and Rockingham Counties.

* **2.2 Special Designation Waters**

Prior to the use of any NWP in any of the following identified waters and contiguous wetlands in North Carolina, applicants must comply with Nationwide Permit General Condition 31 (PCN). The North Carolina waters and contiguous wetlands that require additional notification requirements are:

"Outstanding Resource Waters" (ORW) or "High Quality Waters" (HQW) as designated by the North Carolina Environmental Management Commission; "Inland Primary Nursery Areas" (IPNA) as designated by the NCWRC; "Contiguous Wetlands" as defined by the North Carolina Environmental Management Commission; or "Primary Nursery Areas" (PNA) as designated by the North Carolina Marine Fisheries Commission.

2.3 Coastal Area Management Act (CAMA) Areas of Environmental Concern

Non-federal applicants for any NWP in a designated "Area of Environmental Concern" (AEC) in the twenty (20) counties of Eastern North Carolina covered by the North Carolina Coastal Area Management Act (CAMA) must also obtain the required CAMA permit. Development activities for non-federal projects may not commence until a copy of the approved CAMA permit is furnished to the appropriate Wilmington District Regulatory Field Office (Wilmington Field Office – 69 Darlington Avenue, Wilmington, NC 28403 or Washington Field Office – 2407 West 5th Street, Washington, NC 27889).

* **2.4 Barrier Islands**

Prior to the use of any NWP on a barrier island of North Carolina, applicants must comply with Nationwide Permit General Condition 31 (PCN).

* **2.5 Mountain or Piedmont Bogs**

Prior to the use of any NWP in a Bog classified by the North Carolina Wetland Assessment Methodology (NCWAM), applicants shall comply with Nationwide Permit General Condition 31 (PCN). The latest version of NCWAM is located on the NC DWQ web site at: http://portal.ncdenr.org/web/wq/swp/ws/pdu/ncwam .

* **2.6 Animal Waste Facilities**

Prior to use of any NWP for construction of animal waste facilities in waters of the US, including wetlands, applicants shall comply with Nationwide Permit General Condition 31 (PCN).

* **2.7 Trout Waters**

Prior to any discharge of dredge or fill material into streams or waterbodies within the twenty-five (25) designated trout counties of North Carolina, the applicant shall comply with Nationwide Permit General Condition 31 (PCN). The applicant shall also provide a copy of the notification to the appropriate NCWRC office to facilitate the determination of any potential

impacts to designated Trout Waters. Notification to the Corps of Engineers will include a statement with the name of the NCWRC biologist contacted, the date of the notification, the location of work, a delineation of wetlands, a discussion of alternatives to working in the mountain trout waters, why alternatives were not selected, and a plan to provide compensatory mitigation for all unavoidable adverse impacts to mountain trout waters.

NCWRC and NC Trout Counties

Western Piedmont Region Coordinator	Alleghany	Caldwell	Watauga
20830 Great Smoky Mtn. Expressway	Ashe	Mitchell	Wilkes
Waynesville, NC 28786	Avery	Stokes	
Telephone: (828) 452-2546	Burke	Surry	

Mountain Region Coordinator	Buncombe	Henderson	Polk
20830 Great Smoky Mtn. Expressway	Cherokee	Jackson	Rutherford
Waynesville, NC 28786	Clay	Macon	Swain
Telephone: (828) 452-2546	Graham	Madison	Transylvania
Fax: (828) 452-7772	Haywood	McDowell	Yancey

3.0 List of Corps Regional Conditions for All Nationwide Permits

The following conditions apply to all Nationwide Permits in the Wilmington District:

3.1 Limitation of Loss of Perennial Stream Bed

NWPs may not be used for activities that may result in the loss or degradation of greater than 300 total linear feet of perennial, intermittent or ephemeral stream, unless the District Commander has waived the 300 linear foot limit for ephemeral and intermittent streams on a case-by-case basis and he determines that the proposed activity will result in minimal individual and cumulative adverse impacts to the aquatic environment. Loss of stream includes the linear feet of stream bed that is filled, excavated, or flooded by the proposed activity. Waivers for the loss of ephemeral and intermittent streams must be in writing and documented by appropriate/accepted stream quality assessments*. This waiver only applies to the 300 linear feet threshold for NWPs.

*NOTE: Applicants should utilize the most current methodology prescribed by Wilmington District to assess stream function and quality. Information can be found at:

http://www.saw.usace.army.mil/wetlands/permits/nwp/nwp2012 (see "Quick Links")

3.2 Mitigation for Loss of Stream Bed

For any NWP that results in a loss of more than 150 linear feet of perennial and/or ephemeral/intermittent stream, the applicant shall provide a mitigation proposal to compensate for more than minimal individual and cumulative adverse impacts to the aquatic environment. For stream losses less than 150 linear feet, that require a PCN, the District Commander may determine, on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effect on the aquatic environment.

3.3 Pre-construction Notification for Loss of Streambed Exceeding 150 Feet.

Prior to use of any NWP for any activity which impacts more than 150 total linear feet of perennial stream or ephemeral/ intermittent stream, the applicant must comply with Nationwide Permit General Condition 31 (PCN). This applies to NWPs that do not have specific notification requirements. If a NWP has specific notification requirements, the requirements of the NWP should be followed.

3.4 Restriction on Use of Live Concrete

For all NWPs which allow the use of concrete as a building material, live or fresh concrete, including bags of uncured concrete, may not come into contact with the water in or entering into waters of the US. Water inside coffer dams or casings that has been in contact with wet concrete shall only be returned to waters of the US when it is no longer poses a threat to aquatic organisms.

3.5 Requirements for Using Riprap for Bank Stabilization

For all NWPs that allow for the use of riprap material for bank stabilization, the following measures shall be applied:

3.5.1. Filter cloth must be placed underneath the riprap as an additional requirement of its use in North Carolina waters.

3.5.2. The placement of riprap shall be limited to the areas depicted on submitted work plan drawings.

3.5.3. The riprap material shall be clean and free from loose dirt or any pollutant except in trace quantities that would not have an adverse environmental effect.

3.5.4. It shall be of a size sufficient to prevent its movement from the authorized alignment by natural forces under normal conditions.

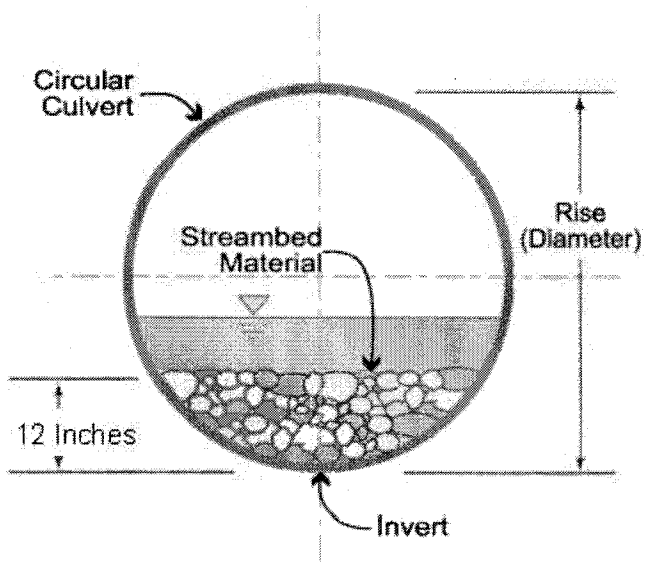
3.5.5. The riprap material shall consist of clean rock or masonry material such as, but not limited to, granite, marl, or broken concrete.

3.5.6. A waiver from the specifications in this Regional Condition may be requested in writing. The waiver will only be issued if it can be demonstrated that the impacts of complying with this Regional condition would result in greater adverse impacts to the aquatic environment.

3.6 Safe Passage Requirements for Culvert Placement

For all NWPs that involve the construction/installation of culverts, measures will be included in the construction/installation that will promote the safe passage of fish and other aquatic organisms. The dimension, pattern, and profile of the stream above and below a pipe or culvert should not be modified by widening the stream channel or by reducing the depth of the stream in connection with the construction activity. The width, height, and gradient of a proposed culvert should be such as to pass the average historical low flow and spring flow without adversely altering flow velocity. Spring flow should be determined from gage data, if available. In the absence of such data, bankfull flow can be used as a comparable level.

In the twenty (20) counties of North Carolina designated as coastal counties by the Coastal Area Management Act (CAMA): All pipes/culverts must be sufficiently sized to allow for the burial of the bottom of the pipe/culvert at least one foot below normal bed elevation when they are placed within the Public Trust Area of Environmental Concern (AEC) and/or the Estuarine Waters AEC as designated by CAMA, and/or all streams appearing as blue lines on United States Geological Survey (USGS) 7.5-minute quadrangle maps.



In all other counties: Culverts greater than 48 inches in diameter will be buried at least one foot below the bed of the stream. Culverts 48 inches in diameter or less shall be buried or placed on the stream bed as practicable and appropriate to maintain aquatic passage, and every effort shall be made to maintain the existing channel slope. The bottom of the culvert must be placed at a

depth below the natural stream bottom to provide for passage during drought or low flow conditions.

Culverts are to be designed and constructed in a manner that minimizes destabilization and head cutting. Destabilizing the channel and head cutting upstream should be considered and appropriate actions incorporated in the design and placement of the culvert.

A waiver from the depth specifications in this condition may be requested in writing. The waiver will be issued if it can be demonstrated that the proposal would result in the least impacts to the aquatic environment.

All counties: Culverts placed within riparian and/or riverine wetlands must be installed in a manner that does not restrict the flow and circulation patterns of waters of the United States. Culverts placed across wetland fills purely for the purposes of equalizing surface water do not have to be buried.

3.7 Notification to NCDENR Shellfish Sanitation Section

Applicants shall notify the NCDENR Shellfish Sanitation Section prior to dredging in or removing sediment from an area closed to shell fishing where the effluent may be released to an area open for shell fishing or swimming in order to avoid contamination from the disposal area and cause a temporary shellfish closure to be made. Such notification shall also be provided to the appropriate Corps of Engineers Regulatory Field Office. Any disposal of sand to the ocean beach should occur between November 1 and April 30 when recreational usage is low. Only clean sand should be used and no dredged sand from closed shell fishing areas may be used. If beach disposal were to occur at times other than stated above or if sand from a closed shell fishing area is to be used, a swimming advisory shall be posted, and a press release shall be issued by the permittee.

3.8 Preservation of Submerged Aquatic Vegetation

Adverse impacts to Submerged Aquatic Vegetation (SAV) are not authorized by any NWP within any of the twenty coastal counties defined by North Carolina's Coastal Area Management Act of 1974 (CAMA).

3.9 Sedimentation and Erosion Control Structures and Measures

3.9.1. All PCNs will identify and describe sedimentation and erosion control structures and measures proposed for placement in waters of the US. The structures and measures should be depicted on maps, surveys or drawings showing location and impacts to jurisdictional wetlands and streams.

4.0 NWP # 13 – Bank Stabilization

4.0.1. Unanchored trees, treetops, or debris may not be used as stream bank stabilization material.

4.0.2. Properly anchored and cabled structural stabilization techniques, such as timber crib structures, revetments, and root wads, are acceptable materials to stabilize stream banks.

4.0.3. If riprap stabilization is needed, it should be placed only on the stream banks, or, if it is necessary to be placed in the stream bed, the finished top elevation of the riprap should not exceed that of the original stream bed.

4.1 NWP #23 – Approved Categorical Exclusions

No development activities authorized by this NWP may begin until the permittee obtains a consistency concurrence or a CAMA permit from the North Carolina Division of Coastal Management, if either is required.

4.2 NWP #33 – Temporary Construction, Access and Dewatering

The required restoration plan must include a timetable for restoration activities.

U.S. ARMY CORPS OF ENGINEERS
Wilmington District
Compensatory Mitigation Responsibility Transfer Form

Permittee: North Carolina Department of Transportation **Action ID:** SAW-2013-00402
Project Name: TIP No. K-5002 **County:** Haywood

Instructions to Permittee: The Permittee must provide a copy of this form to the Mitigation Sponsor, either an approved Mitigation Bank or the North Carolina Ecosystem Enhancement Program (NCEEP), who will then sign the form to verify the transfer of the mitigation responsibility. Once the Sponsor has signed this form, it is the Permittee's responsibility to ensure that to the U.S. Army Corps of Engineers (USACE) Project Manager identified on page two is in receipt of a signed copy of this form before conducting authorized impacts, unless otherwise specified below. If more than one mitigation Sponsor will be used to provide the mitigation associated with the permit, or if the impacts and/or the mitigation will occur in more than one 8-digit Hydrologic Unit Code (HUC), multiple forms will be attached to the permit, and the separate forms for each Sponsor and/or HUC must be provided to the appropriate mitigation Sponsors.

Instructions to Sponsor: The Sponsor must verify that the mitigation requirements shown below are available at the identified site. By signing below, the Sponsor is accepting full responsibility for the identified mitigation, regardless of whether or not they have received payment from the Permittee. Once the form is signed, the Sponsor must update the appropriate ledger and provide a copy of the signed form to the Permittee and to the USACE Bank/In-Lieu Fee Program Manager. The Sponsor must also comply with all reporting requirements established in their authorizing instrument.

Permitted Impacts and Compensatory Mitigation Requirements:

Permitted Impacts Requiring Mitigation* **8-digit HUC and Basin:** 06010106, French Broad River Basin

Stream Impacts (linear feet)			Wetland Impacts (acres)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-riverine	Non-Riparian	Coastal
		39				

*If more than one mitigation sponsor will be used for the permit, only include impacts to be mitigated by this sponsor.

Compensatory Mitigation Requirements: **8-digit HUC and Basin:** 06010106, French Broad River Basin

Stream Mitigation (credits)			Wetland Mitigation (credits)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-riverine	Non-Riparian	Coastal
		78				

Mitigation Site Debited: NCEEP
(List the name of the bank to be debited. For umbrella banks, also list the specific site. For NCEEP, list NCEEP. If the NCEEP acceptance letter identifies a specific site, also list the specific site to be debited).

Section to be completed by the Mitigation Sponsor

Statement of Mitigation Liability Acceptance: I, the undersigned, verify that I am authorized to approve mitigation transactions for the Mitigation Sponsor shown below, and I certify that the Sponsor agrees to accept full responsibility for providing the mitigation identified in this document (see the table above), associated with the USACE Permittee and Action ID number shown. I also verify that released credits (and/or advance credits for NCEEP), as approved by the USACE, are currently available at the mitigation site identified above. Further, I understand that if the Sponsor fails to provide the required compensatory mitigation, the USACE Wilmington District Engineer may pursue measures against the Sponsor to ensure compliance associated with the mitigation requirements.

Mitigation Sponsor Name: NCDENR EEP

Name of Sponsor's Authorized Representative: Beth Harmon

Beth Harmon — 3/15/2013
Signature of Sponsor's Authorized Representative — **Date of Signature**

 Form Updated 2 October, 2012

USACE Wilmington District
Compensatory Mitigation Responsibility Transfer Form, Page 2

Conditions for Transfer of Compensatory Mitigation Credit:

- Once this document has been signed by the Mitigation Sponsor and the USACE is in receipt of the signed form, the Permittee is no longer responsible for providing the mitigation identified in this form, though the Permittee remains responsible for any other mitigation requirements stated in the permit conditions.
- Construction within jurisdictional areas authorized by the permit identified on page one of this form can begin only after the USACE is in receipt of a copy of this document signed by the Sponsor, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein. For authorized impacts conducted by the North Carolina Department of Transportation (NCDOT), construction within jurisdictional areas may proceed upon permit issuance; however, a copy of this form signed by the Sponsor must be provided to the USACE within 30 days of permit issuance. NCDOT remains fully responsible for the mitigation until the USACE has received this form, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein.
- Signed copies of this document must be retained by the Permittee, Mitigation Sponsor, and in the USACE administrative records for both the permit and the Bank/ILF Instrument. It is the Permittee's responsibility to ensure that the USACE Project Manager (address below) is provided with a signed copy of this form.
- If changes are proposed to the type, amount, or location of mitigation after this form has been signed and returned to the USACE, the Sponsor must obtain case-by-case approval from the USACE Project Manager and/or North Carolina Interagency Review Team (NCIRT). If approved, higher mitigation ratios may be applied, as per current District guidance and a new version of this form must be completed and included in the USACE administrative records for both the permit and the Bank/ILF Instrument.

Comments/Additional Conditions:

This form is not valid unless signed by the mitigation Sponsor and USACE Project Manager. For questions regarding this form or any of the conditions of the permit authorization, contact the Project Manager at the address below.

USACE Project Manager: Lori Beckwith
USACE Field Office: Asheville Regulatory Field Office
US Army Corps of Engineers
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006
Email: loretta.a.beckwith@usace.army.mil

BECKWITH.LORETTA.ANN.1173452264 Digitally signed by BECKWITH.LORETTA.ANN.1173452264 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=BECKWITH.LORETTA.ANN.1173452264 Date: 2013.03.12 09:57:28 -04'00'

Lori Beckwith — March 12, 2013

USACE Project Manager Signature — **Date of Signature**

Current Wilmington District mitigation guidance, including information on mitigation ratios, functional assessments, and mitigation bank location and availability, and credit classifications (including stream temperature and wetland groupings) is available at http://ribits.usace.army.mil.

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the Customer Satisfaction Survey located at our website at http://regulatory.usacesurvey.com/ to complete the survey online.

R-39

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Water Quality
Charles Wakild, P.E.
Director

Pat McCrory
Governor

John E. Skvarla, III
Secretary

RECEIVED
FEB 14 2013
DIVISION OF HIGHWAYS
PDEA-OFFICE OF NATURAL ENVIRONMENT

February 13, 2013
Haywood County
DWQ Project 20130113
TIP No. K5002
US 23-74 Rest Area

Approval of 401 Water Quality Certification with Additional Conditions

Dr. Gregory J. Thorpe, Ph.D., Manager
Project Development and Environmental Analysis Unit
North Carolina Department of Transportation
1598 Mail Service center Webster Road
Raleigh, North Carolina, 27699

Dear Dr. Thorpe:

You have our approval, in accordance with the conditions listed below, for the following impacts in an unnamed tributary to Richland Creek for the purpose of building a new rest area adjacent to US Highway 23-74 in Haywood County:

Stream Impacts in the French Broad River Basin

Site	Permanent Fill in Intermittent Stream (linear ft)	Streambank Stabilization in Perennial Stream (linear ft)	Permanent Fill in Perennial Stream (linear ft)	Temporary Impacts in Perennial Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
Site 1	**0**	**15**	**39**	**13**	**67**	**0**
Total	**0**	**15**	**39**	**13**	**67**	**0**

Total Permanent Stream Impacts for Project: 54 lin. ft. Total Temporary Stream Impacts for Project: 13 linear ft.

The project should be constructed in accordance with your application dated January 30, 2013 (received February 5, 2013), including the environmental commitments made in the application letter. After reviewing your application, we have decided that these impacts are covered by General Water Quality Certification No. 3885, 3891 and 3893 corresponding to the U.S. Army Corps of Engineers Nationwide Permit Numbers 13, 23 and 33. In addition, you should acquire any other federal, state or local permits before you proceed with your project including (but not limited to) Sediment and Erosion Control, Non-Discharge and Water Supply Watershed regulations.

This approval is valid solely for the purpose and design described in your application (unless modified below). Should your project change, you must notify the DWQ and submit a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter, and is thereby responsible for complying with all conditions. If total wetland fills for this project (now or in the future) exceed one acre, or if total impacts to streams (now or in the future) exceed 150 linear feet, compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). *For this approval to be valid, you must follow the conditions listed in the attached certification and any additional conditions listed below.*

Condition(s) of Certification:

1. There shall be no excavation from, or waste disposal into, jurisdictional wetlands or waters associated with this permit without appropriate modification. Should waste or borrow sites, or access roads to waste or borrow sites, be located in wetlands or streams, compensatory mitigation will be required since that is a direct impact from road construction activities.
2. Sediment and erosion control measures shall not be placed in wetlands or waters unless otherwise approved by this Certification. If placement of sediment and erosion control devices in wetlands and waters is unavoidable, they shall be removed and the natural grade restored upon completion of the project.
3. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to protect surface waters standards:
    a. The erosion and sediment control measures for the project must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Sediment and Erosion Control Planning and Design Manual.*
    b. The design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal, or exceed, the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual.* The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.
    c. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual.*
    d. The reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act.
4. Unless otherwise approved in this certification, placement of culverts and other structures in open waters and streams shall be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than 48 inches, to allow low flow passage of water and aquatic life. Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or streambeds or banks, adjacent to or upstream and down stream of the above structures. The applicant is required to provide evidence that the equilibrium is being maintained if requested in writing by NCDWQ. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact NCDWQ for guidance on how to proceed and to determine whether or not a permit modification will be required.
5. In-stream work and land disturbance within the 25-foot buffer zone are prohibited during the trout-spawning season of October 15 through April 15 to protect the egg and fry stages of trout.
6. For projects impacting waters classified by the NC Environmental Management Commission as Trout (Tr), High Quality Waters (HQW), or Water Supply I or II (WSI, WSII) stormwater shall be directed to vegetated buffer areas, grass-lined ditches or other means appropriate to the site for the purpose of pre-treating storm water runoff prior to discharging directly into streams. Mowing of existing vegetated buffers is strongly discouraged.

7. The permittee shall use /Design Standards in Sensitive Watersheds/ [15A NCAC 4B.0124(a)-(e)] in areas draining to (HQW) waters. However, due to the size of the project, NC DOT shall not be required to meet 15A NCAC 4B .0124(a) regarding the maximum amount of uncovered acres. Temporary cover (wheat, millet, or similar annual grain) or permanent herbaceous cover shall be planted on all bare soil within 15 business days of ground disturbing activities to provide erosion control.

   Tall fescue shall not be used in the establishment of temporary or permanent groundcover within riparian areas. For the establishment of permanent herbaceous cover, erosion control matting shall be used in conjunction with an appropriate native seed mix on disturbed soils within the riparian area and on disturbed steep slopes with the following exception. Erosion control matting is not necessary if the area is contained by perimeter erosion control devices such as silt fence, temporary sediment ditches, basins, etc. Matting should be secured in place with staples, stakes, or wherever possible, live stakes of native trees. Erosion control matting placed in riparian areas shall not contain a nylon mesh grid, which can impinge and entrap small animals. For the establishment of temporary groundcover within riparian areas, hydroseeding along with wood or cellulose based hydro mulch applied from a fertilizer- and limestone-free tank is allowable at the appropriate rate in conjunction with the erosion control measures. Discharging hydroseed mixtures and wood or cellulose mulch into surface waters in prohibited. Riparian areas are defined as a distance 25 feet landward from top of stream bank.
8. If multiple pipes or barrels are required, they shall be designed to mimic natural stream cross section as closely as possible including pipes or barrels at flood plain elevation and/or sills where appropriate. Widening the stream channel should be avoided. Stream channel widening at the inlet or outlet end of structures typically decreases water velocity causing sediment deposition that requires increased maintenance and disrupts aquatic life passage.
9. All work in or adjacent to stream waters shall be conducted in a dry work area. Approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities manual such as sandbags, rock berms, cofferdams and other diversion structures shall be used to prevent excavation in flowing water.
10. The stream channel shall be excavated no deeper than the natural bed material of the stream, to the maximum extent practicable. Efforts must be made to minimize impacts to the stream banks, as well as to vegetation responsible for maintaining stream bank stability. Any applicable riparian buffer impact for access to stream channel shall be temporary and be revegetated with native riparian species.
11. The dimension, pattern and profile of the stream, above and below the crossing, shall not be modified. Disturbed floodplains and streams shall be restored to natural geomorphic conditions.
12. Native riparian vegetation (e.g. rhododendron, dog hobble, willows, alders, sycamores, dogwoods, black walnut and red maple) must be reestablished within the construction limits of the project by the end of the growing season following completion of construction.
13. The use of rip-rap above the Normal High Water Mark shall be minimized. Any rip-rap placed for stream stabilization shall be placed in stream channels in such a manner that it does not impede aquatic life passage.
14. Rip-rap shall not be placed in the active thalweg channel or placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be properly designed, sized and installed.
15. Heavy equipment shall be operated from the banks rather than in the stream channels in order to minimize sedimentation and reduce the introduction of other pollutants into the stream.
16. All mechanized equipment operated near surface waters must be regularly inspected and maintained to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids, or other toxic materials.
* 17. The Permittee shall ensure that the final design drawings adhere to the permit and to the permit drawings submitted for approval.
18. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited.
19. If concrete is used during construction, a dry work area shall be maintained to prevent direct contact between curing concrete and stream water. Water that inadvertently contacts uncured concrete shall not be discharged to surface waters due to the potential for elevated pH and possible aquatic life and fish kills.

20. No rock, sand or other materials shall be dredged from the stream channel, except where authorized by this certification.
21. A copy of this Water Quality Certification shall be maintained on the construction site at all times. In addition, the Water Quality Certification and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager.
22. All fill slopes located in jurisdictional wetlands shall be placed at slopes no flatter than 3:1, unless otherwise authorized by this certification.
23. During the construction of the project, no staging of equipment of any kind is permitted in waters of the U.S., or protected riparian buffers.
24. The outside buffer, wetland or water boundary located within the construction corridor approved by this authorization shall be clearly marked by highly visible fencing prior to any land disturbing activities. Impacts to areas within the fencing are prohibited unless otherwise authorized by this certification.
25. The permittee and its authorized agents shall conduct its activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act) and any other appropriate requirements of State and Federal law. If NCDWQ determines that such standards or laws are not being met (including the failure to sustain a designated or achieved use) or that State of Federal law is being violated, or that further conditions are necessary to assure compliance, NCDWQ may reevaluate and modify this certification.
26. The issuance of this certification does not exempt the Permittee form complying with any and all statutes, rules, regulations or ordinances that may be imposed by other government agencies (i.e. local, state, and federal) having jurisdiction, including but not limited to applicable buffer rules, stormwater management rules, soil erosion and sedimentation control requirements, etc.
27. The Permittee shall report any violations of this certification to the Division of Water Quality within 24-hours of discovery.

* 28. Upon completion of the project (including any impacts at associated borrow or waste sites), the NCDOT Division Engineer shall complete and return the enclosed "Certification of Completion Form" to notify NCDWQ when all work included in the §401 Certification has been completed.

Violations of any condition herein set forth may result in revocation of this Certification and may result in criminal and/or civil penalties. This Certification shall become null and void unless the above conditions are made conditions of the Federal 404 and/or Coastal Area Management Act Permit. This Certification shall expire upon the expiration of the 404 or CAMA permit.

If this Certification is unacceptable to you have the right to an adjudicatory hearing upon written request within sixty (60) days following receipt of this Certification. This request must be in the form of a written petition conforming to Chapter 150B of the North Carolina General Statutes and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, N.C. 27699-6714. If modifications are made to an original Certification, you have the right to an adjudicatory hearing on the modifications upon written request within sixty (60) days following receipt of the Certification. Unless such demands are made, this Certification shall be final and binding.

This letter completes the review of the Division of Water Quality under Section 401 of the Clean Water Act. If you have any questions, please telephone **Mr. Mike Parker** of the Asheville Regional Office at 828.296.4500.

Sincerely,

Michael R. Parker

for Charles Wakild, P.E., Director
Division of Water Quality

Attachments

cc: Lori Beckwith, USACE, Asheville Field Office
Mark Davis, Division 14, DEO
Ben DeWit, Roadside Environmental
Marla Chambers, NCWRC
Transportation Permitting Unit
Asheville Regional Office

Hemphill, Jeffrey L

From: Parker, Mike
Sent: Monday, April 08, 2013 3:31 PM
To: Hemphill, Jeffrey L
Subject: RE: K-5002 Aquatic Passage

Jeff, I am ok with what you are proposing as long as aquatic passage is maintained. If not NCDOT will have to find a solution. If you have questions, please let me know. Mike

Mike Parker - Mike.Parker@ncdenr.gov
North Carolina Dept. of Environment and Natural Resources
Asheville Regional Office
Division of Water Quality - Surface Water Protection
2090 U.S. 70 Highway
Swannanoa, NC 28778
Tel: 828-296-4500
Fax: 828-299-7043

From: Hemphill, Jeffrey L
Sent: Monday, April 08, 2013 10:07 AM
To: Parker, Mike
Subject: K-5002 Aquatic Passage

Mike
I just need an email confirmation that you are OK with this greensheet commitment for K-5002
Thanks
Jeff

From: Hemphill, Jeffrey L
Sent: Thursday, March 14, 2013 10:10 AM
To: Parker, Mike
Subject: K-5002 Aquatic Passage

Mike
I thought I had already sent this to you but this from the Hydro Engineer and will be a greensheet commitment:

The new section of 60" CMP is being added to the upstream end of the existing 60" crossing and due to the fact that the existing pipe crossing is not buried, the new section of pipe will not be able to be buried without impeding aquatic passage. Burying the new section of pipe would cause the outlet invert of the new section to be much lower than the inlet invert of the existing crossing. It is also not feasible to bury the inlet end only of the proposed section due to the fact that this would result in negative slope of this pipe section. The state of the existing aquatic passage should be maintained due to the depth of normal flow in the stream and by maintaining the existing stream slope by placing the new section of pipe at the proposed elevations.

Email correspondence to and from this sender is subject to the N.C. Public Records Law and may be disclosed to third parties.

R-45

Water Quality Certification No. 3885

GENERAL CERTIFICATION FOR STREAM RESTORATION, ENHANCEMENT AND STABILIZATION PROJECTS AND WETLAND AND RIPARIAN RESTORATION AND CREATION ACTIVITIES INCLUDING THOSE ELIGIBLE FOR U.S. ARMY CORPS OF ENGINEERS NATIONWIDE PERMIT NUMBERS 13 (BANK STABILIZATION) AND 27 (WETLAND AND RIPARIAN RESTORATION AND CREATION), AND REGIONAL PERMIT 197800080 (BULKHEADS AND RIPRAP) AND RIPARIAN AREA PROTECTION RULES (BUFFER RULES)

Water Quality Certification Number 3885 is issued in conformity with the requirements of Section 401, Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Quality Regulations in 15A NCAC 02H .0500 and 15A NCAC 02B .0200 for the discharge of fill material to waters as described in 33 CFR 330 Appendix A (B) (13 and 27) and Regional Permit 197800080 and for the Riparian Area Protection Rules (Buffer Rules) in 15A NCAC 02B .0200.

The State of North Carolina certifies that the specified category of activity will not violate applicable portions of Sections 301, 302, 303, 306 and 307 of the Public Laws 92-500 and 95-217 if conducted in accordance with the conditions hereinafter set forth.

Activities meeting any one (1) of the following thresholds or circumstances require *written approval* for a 401 Water Quality Certification from the Division of Water Quality (the "Division"):

* a) All proposed fill or modification of wetlands and/or waters, including streams and streambanks, regardless of the purpose of the restoration, enhancement, stabilization, or creation activity, except for single and independent projects involving in-stream structures for the sole purpose of streambank stabilization, which are designed based on current natural channel techniques, and do not exceed a total of three structures within 100 feet or less of streambank; or

b) Any stream relocation; or

c) Bank Stabilization projects qualifying for Nationwide Permit 13 for erosion protection which utilize non-natural armoring such as riprap, gabion baskets, deflection walls etc of greater than 150 feet in streambank length; or

d) Bank Stabilization projects qualifying for Nationwide Permit 13 for erosion protection which utilize natural streambank sloping, vegetation, and other natural channel protection techniques of greater than 500 feet of streambank length; or

e) Any impact associated with a Notice of Violation or an enforcement action for violation(s) of DWQ Wetland Rules (15A NCAC 02H .0500), Isolated Wetland Rules (15A NCAC 02H .1300), DWQ Surface Water or Wetland Standards, or Riparian Buffer Rules (15A NCAC 02B .0200); or

* f) Any impacts to streams and/or buffers in the Neuse, Tar-Pamlico, or Catawba River Basins or in the Randleman, Jordan or Goose Creek Watersheds (or any other basin or watershed with Riparian Area Protection Rules [Buffer Rules] in effect at the time of application) *unless* the activities are listed as "EXEMPT" from these rules or a Buffer Authorization Certificate is issued through N.C. Division of Coastal Management (DCM) delegation for "ALLOWABLE" activities.

* In accordance with North Carolina General Statute 143-215.3D(e), written approval for a 401 Water Quality General Certification must include the appropriate fee. If a project also requires a CAMA Permit, then one payment to both agencies shall be submitted and will be the higher of the two fees.

Water Quality Certification No. 3885

Activities included in this General Certification that do not meet one of the thresholds listed above do not require written approval from the Division as long as they comply with the Conditions of Certification listed below. If any of these Conditions cannot be met, then written approval from the Division is required.

Conditions of Certification:

1. Activities shall meet the definitions, design, and monitoring protocols specified within the US Army Corps of Engineers Wilmington District *Regulatory Guidance Letter* (RGL02-02) and the *Stream Mitigation Guidelines* (April 2003) or any subsequent updates to these documents.

2. No Impacts Beyond those Authorized in the Written Approval or Beyond the Threshold of Use of this Certification

   No waste, spoil, solids, or fill of any kind shall occur in wetlands, waters, or riparian areas beyond the footprint of the impacts depicted in the Pre-Construction Notification, as authorized in the written approval from the Division or beyond the thresholds established for use of this Certification without written authorization, including incidental impacts. All construction activities, including the design, installation, operation, and maintenance of sediment and erosion control Best Management Practices shall be performed so that no violations of state water quality standards, statutes, or rules occur. Approved plans and specifications for this project are incorporated by reference and are enforceable parts of this permit.

3. Standard Erosion and Sediment Control Practices

   Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices and if applicable, comply with the specific conditions and requirements of the NPDES Construction Stormwater Permit issued to the site:

   a. Design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal or exceed the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual.* The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.

   b. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual.*

   c. Reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act and the Mining Act of 1971.

   d. Sufficient materials required for stabilization and/or repair of erosion control measures and stormwater routing and treatment shall be on site at all times.

   e. If the project occurs in waters or watersheds classified as Primary Nursery Areas (PNAs), SA, WS-I, WS-II, High Quality (HQW), or Outstanding Resource (ORW) waters, then the sedimentation and erosion control designs must comply with the requirements set forth in 15A NCAC 04B .0124, *Design Standards in Sensitive Watersheds.*

Water Quality Certification No. 3885

4. No Sediment and Erosion Control Measures in Wetlands or Waters

   Sediment and erosion control measures shall not be placed in wetlands or waters. Exceptions to this condition require application submittal to and written approval by the Division. If placement of sediment and erosion control devices in wetlands and waters is unavoidable, then design and placement of temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands, stream beds, or banks, adjacent to or upstream and downstream of the above structures. All sediment and erosion control devices shall be removed and the natural grade restored within two (2) months of the date that the Division of Land Resources (DLR) or locally delegated program has released the specific area within the project.

5. Construction Stormwater Permit NCG010000

   An NPDES Construction Stormwater Permit is required for construction projects that disturb one (1) or more acres of land. This Permit allows stormwater to be discharged during land disturbing construction activities as stipulated in the conditions of the permit. If your project is covered by this permit, full compliance with permit conditions including the erosion & sedimentation control plan, inspections and maintenance, self-monitoring, record keeping and reporting requirements is required. A copy of the general permit (NCG010000), inspection log sheets, and other information may be found at http://portal.ncdenr.org/web/wq/ws/su/npdessw#tab-w .

   The North Carolina Department of Transportation (NCDOT) shall be required to be in full compliance with the conditions related to construction activities within the most recent version of their individual NPDES (NCS000250) stormwater permit.

6. Construction Moratoriums and Coordination

   If activities must occur during periods of high biological activity (i.e. sea turtle nesting, fish spawning, or bird nesting), then biological monitoring may be required at the request of other state or federal agencies and coordinated with these activities.

   All moratoriums on construction activities established by the NC Wildlife Resources Commission (WRC), US Fish and Wildlife Service (USFWS), NC Division of Marine Fisheries (DMF), or National Marine Fisheries Service (NMFS) to lessen impacts on trout, anadromous fish, larval/post-larval fishes and crustaceans, or other aquatic species of concern shall be implemented. Exceptions to this condition require written approval by the resource agency responsible for the given moratorium.

   Work within the twenty-five (25) designated trout counties or identified state or federal endangered or threatened species habitat shall be coordinated with the appropriate WRC, USFWS, NMFS, and/or DMF personnel.

7. Work in the Dry

   All work in or adjacent to stream waters shall be conducted so that the flowing stream does not come in contact with the disturbed area. Approved best management practices from the most current version of the NC Sediment and Erosion Control Manual, or the NC DOT Construction and Maintenance Activities Manual, such as sandbags, rock berms, cofferdams, and other diversion structures shall be used to minimize excavation in flowing water. Exceptions to this condition require application submittal to and written approval by the Division.

8. Riparian Area Protection (Buffer) Rules

   Activities located in the protected riparian areas (whether jurisdictional wetlands or not), within the Neuse, Tar-Pamlico, or Catawba River Basins or in the Randleman, Jordan, or Goose Creek Watersheds (or any other basin or watershed with buffer rules) shall be limited to "uses" identified within and constructed in accordance with 15A NCAC 02B .0233, .0259, .0243, .0250, .0267 and .0605, and shall be located, designed, constructed, and maintained to have minimal disturbance to protect water quality to the maximum extent practicable through the use of best management practices. All buffer rule requirements, including diffuse flow requirements, must be met.

9. If concrete is used during the construction, then all necessary measures shall be taken to prevent direct contact between uncured or curing concrete and waters of the state. Water that inadvertently contacts uncured concrete shall not be discharged to waters of the state due to the potential for elevated pH and possible aquatic life/ fish kills.

10. All temporary fill and culverts shall be removed and the impacted area returned to natural conditions within 60 days of the determination that the temporary impact is no longer necessary. The impacted areas shall be restored to original grade, including each stream's original cross sectional dimensions, plan form pattern, and longitudinal bed and bed profile, and the various sites shall be stabilized with natural woody vegetation (except for the approved maintenance areas) and restored to prevent erosion.

11. All temporary pipes/ culverts/ riprap pads etc, shall be installed in all streams as outlined in the most recent edition of the *North Carolina Sediment and Erosion Control Planning and Design Manual* or the *North Carolina Surface Mining Manual* so as not to restrict stream flow or cause dis-equilibrium during use of this General Certification.

12. Any riprap required for proper culvert placement, stream stabilization, or restoration of temporarily disturbed areas shall be restricted to the area directly impacted by the approved construction activity. All rip-rap shall buried and/or "keyed in" such that the original stream elevation and streambank contours are restored and maintained. Placement of rip-rap or other approved materials shall not result in de-stabilization of the stream bed or banks upstream or downstream of the area.

13. Any rip-rap used for stream stabilization shall be of a size and density so as not to be able to be carried off by wave, current action, or stream flows and consist of clean rock or masonry material free of debris or toxic pollutants. Rip-rap shall not be installed in the streambed except in specific areas required for velocity control and to ensure structural integrity of bank stabilization measures.

14. A one-time application of fertilizer to re-establish vegetation is allowed in disturbed areas including riparian buffers, but is restricted to no closer than 10 feet from top of bank of streams. Any fertilizer application must comply with all other Federal, State and Local regulations.

15. Applications for riprap groins proposed in accordance with 15A NCAC 07H .1401 (NC Division of Coastal Management General Permit for construction of Wooden and Riprap Groins in Estuarine and Public Trust Waters) must meet all the specific conditions for design and construction specified in 15A NCAC 07H .1405.

16. Compensatory Mitigation

    In accordance with 15A NCAC 02H .0506 (h), compensatory mitigation may be required for losses of equal to or greater than 150 linear feet of streams (intermittent and perennial) and/or equal to or greater than one (1) acre of wetlands. For linear public transportation projects, impacts equal to or exceeding 150 linear feet per stream shall require mitigation.

    Buffer mitigation may be required for any project with Buffer Rules in effect at the time of application for activities classified as "Allowable with Mitigation" or "Prohibited" within the Table of Uses.

    A determination of buffer, wetland, and stream mitigation requirements shall be made for any General Water Quality Certification for this Nationwide and/or Regional General Permit. Design and monitoring protocols shall follow the US Army Corps of Engineers Wilmington District *Stream Mitigation Guidelines* (April 2003) or its subsequent updates. Compensatory mitigation plans shall be submitted to the Division for written approval as required in those protocols. The mitigation plan must be implemented and/or constructed before any impacts occur on site. Alternatively, the Division will accept payment into an in-lieu fee program or a mitigation bank. In these cases, proof of payment shall be provided to the Division before any impacts occur on site.

* 17. If an environmental document is required under the National or State Environmental Policy Act (NEPA or SEPA), then this General Certification is not valid until a Finding of No Significant Impact (FONSI) or Record of Decision (ROD) is issued by the State Clearinghouse.

18. In the twenty (20) coastal counties, the appropriate DWQ Regional Office must be contacted to determine if Coastal Stormwater Regulations will be required.

19. This General Certification does not relieve the applicant of the responsibility to obtain all other required Federal, State, or Local approvals.

20. The applicant/permittee and their authorized agents shall conduct all activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act), and any other appropriate requirements of State and Federal Law. If the Division determines that such standards or laws are not being met, including failure to sustain a designated or achieved use, or that State or Federal law is being violated, or that further conditions are necessary to assure compliance, then the Division may reevaluate and modify this General Water Quality Certification.

* 21. When written authorization is required for use of this certification, upon completion of all permitted impacts included within the approval and any subsequent modifications, the applicant shall be required to return the certificate of completion attached to the approval. One copy of the certificate shall be sent to the DWQ Central Office in Raleigh at 1650 Mail Service Center, Raleigh, NC, 27699-1650.

22. Additional site-specific conditions, including monitoring and/or modeling requirements, may be added to the written approval letter for projects proposed under this Water Quality Certification in order to ensure compliance with all applicable water quality and effluent standards.

23. This certification grants permission to the director, an authorized representative of the Director, or DENR staff, upon the presentation of proper credentials, to enter the property during normal business hours.

Water Quality Certification No. 3885

This General Certification shall expire on the same day as the expiration date of the corresponding Nationwide and/or Regional General Permit. The conditions in effect on the date of issuance of Certification for a specific project shall remain in effect for the life of the project, regardless of the expiration date of this Certification.

Non-compliance with or violation of the conditions herein set forth by a specific project may result in revocation of this General Certification for the project and may also result in criminal and/or civil penalties.

The Director of the North Carolina Division of Water Quality may require submission of a formal application for Individual Certification for any project in this category of activity if it is determined that the project is likely to have a significant adverse effect upon water quality, including state or federally listed endangered or threatened aquatic species, or degrade the waters so that existing uses of the wetland or downstream waters are precluded.

Public hearings may be held for specific applications or group of applications prior to a Certification decision if deemed in the public's best interest by the Director of the North Carolina Division of Water Quality.

Effective date: March 19, 2012

DIVISION OF WATER QUALITY

By

Matt Matt for

Charles Wakild, P.E.

Director

History Note: Water Quality Certification (WQC) Number 3885 issued March 19, 2012 replaces WQC Number 3689 issued November 1, 2007; WQC Number 3626 issued March, 2007; WQC Number 3495 issued December 31, 2004; and WQC Number 3399 issued March 2003. This General Certification is rescinded when the Corps of Engineers reauthorizes any of the corresponding Nationwide and/or Regional General Permits and/or when deemed appropriate by the Director of the Division of Water Quality.

Water Quality Certification No. 3891

GENERAL CERTIFICATION FOR PROJECTS ELIGIBLE FOR U.S. ARMY CORPS OF ENGINEERS NATIONWIDE PERMIT NUMBER 23 (APPROVED CATEGORICAL EXCLUSIONS) AND RIPARIAN AREA PROTECTION RULES (BUFFER RULES)

Water Quality Certification Number 3891 is issued in conformity with the requirements of Section 401, Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Quality Regulations in 15A NCAC 02H .0500 and 15A NCAC 02B .0200 for the discharge of fill material to waters and wetland areas as described in 33 CFR 330 Appendix A (B) (23) and for the Riparian Area Protection Rules (Buffer Rules) in 15A NCAC 02B .0200.

The category of activities shall include only Federally-approved Categorical Exclusion projects.

The State of North Carolina certifies that the specified category of activity will not violate applicable portions of Sections 301, 302, 303, 306 and 307 of the Public Laws 92-500 and 95-217 if conducted in accordance with the conditions hereinafter set forth.

Activities meeting any one (1) of the following thresholds or circumstances require *written approval* for a 401 Water Quality Certification from the Division of Water Quality (the "Division"):

a) Stream impacts (temporary or permanent) equal or greater than 40 linear feet; or
b) Any stream relocation; or
c) Impacts equal to or greater than one-tenth (1/10) acre of wetlands or open waters; or
d) Any impacts to wetlands adjacent to waters designated as: ORW, SA, WS-I, WS-II, or Trout, or wetlands contiguous to waters designated as a North Carolina or National Wild and Scenic River.
e) Any impacts to coastal wetlands [15A NCAC 7H .0205)], or Unique Wetlands (UWL) [15A NCAC 2H .0506].
f) Any impact associated with a Notice of Violation or an enforcement action for violation(s) of DWQ Wetland Rules (15A NCAC 02H .0500), Isolated Wetland Rules (15A NCAC 02H .1300), DWQ Surface Water or Wetland Standards, or Riparian Buffer Rules (15A NCAC 02B .0200); or
* g) Any impacts to streams and/or buffers in the Neuse, Tar-Pamlico, or Catawba River Basins or in the Randleman, Jordan or Goose Creek Watersheds (or any other basin or watershed with Riparian Area Protection Rules [Buffer Rules] in effect at the time of application) *unless* the activities are listed as "EXEMPT" from these rules or a Buffer Authorization Certificate is issued through N.C. Division of Coastal Management (DCM) delegation for "ALLOWABLE" activities.

* In accordance with North Carolina General Statute 143-215.3D(e), written approval for a 401 Water Quality General Certification must include the appropriate fee. If a project also requires a CAMA Permit, then one payment to both agencies shall be submitted and will be the higher of the two fees.

Activities included in this General Certification that do not meet one of the thresholds listed above do not require written approval from the Division as long as they comply with the Conditions of Certification listed below. If any of these Conditions cannot be met, then written approval from the Division is required.

Conditions of Certification:

1. No Impacts Beyond those Authorized in the Written Approval or Beyond the Threshold of Use of this Certification

   No waste, spoil, solids, or fill of any kind shall occur in wetlands, waters, or riparian areas beyond the footprint of the impacts depicted in the Pre-Construction Notification, as

authorized in the written approval from the Division or beyond the thresholds established for use of this Certification without written authorization, including incidental impacts. All construction activities, including the design, installation, operation, and maintenance of sediment and erosion control Best Management Practices shall be performed so that no violations of state water quality standards, statutes, or rules occur. Approved plans and specifications for this project are incorporated by reference and are enforceable parts of this permit.

2. Standard Erosion and Sediment Control Practices

   Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices and if applicable, comply with the specific conditions and requirements of the NPDES Construction Stormwater Permit issued to the site:

   a. Design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal or exceed the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual.* The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.

   b. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual.*

   c. Reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act and the Mining Act of 1971.

   d. Sufficient materials required for stabilization and/or repair of erosion control measures and stormwater routing and treatment shall be on site at all times.

   e. If the project occurs in waters or watersheds classified as Primary Nursery Areas (PNAs), SA, WS-I, WS-II, High Quality (HQW), or Outstanding Resource (ORW) waters, then the sedimentation and erosion control designs must comply with the requirements set forth in 15A NCAC 04B .0124, *Design Standards in Sensitive Watersheds.*

3. No Sediment and Erosion Control Measures in Wetlands or Waters

   Sediment and erosion control measures shall not be placed in wetlands or waters. Exceptions to this condition require application submittal to and written approval by the Division. If placement of sediment and erosion control devices in wetlands and waters is unavoidable, then design and placement of temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands, stream beds, or banks, adjacent to or upstream and downstream of the above structures. All sediment and erosion control devices shall be removed and the natural grade restored within two (2) months of the date that the Division of Land Resources (DLR) or locally delegated program has released the specific area within the project.

4. Construction Stormwater Permit NCG010000

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An NPDES Construction Stormwater Permit is required for construction projects that disturb one (1) or more acres of land. This Permit allows stormwater to be discharged during land disturbing construction activities as stipulated in the conditions of the permit. If your project is covered by this permit, full compliance with permit conditions including the erosion & sedimentation control plan, inspections and maintenance, self-monitoring, record keeping and reporting requirements is required. A copy of the general permit (NCG010000), inspection log sheets, and other information may be found at http://portal.ncdenr.org/web/wq/ws/su/npdesswf#tab-w .

The North Carolina Department of Transportation (NCDOT) shall be required to be in full compliance with the conditions related to construction activities within the most recent version of their individual NPDES (NCS000250) stormwater permit.

5. Construction Moratoriums and Coordination

If activities must occur during periods of high biological activity (i.e. sea turtle nesting, fish spawning, or bird nesting), then biological monitoring may be required at the request of other state or federal agencies and coordinated with these activities.

All moratoriums on construction activities established by the NC Wildlife Resources Commission (WRC), US Fish and Wildlife Service (USFWS), NC Division of Marine Fisheries (DMF), or National Marine Fisheries Service (NMFS) to lessen impacts on trout, anadromous fish, larval/post-larval fishes and crustaceans, or other aquatic species of concern shall be implemented. Exceptions to this condition require written approval by the resource agency responsible for the given moratorium.

Work within the twenty-five (25) designated trout counties or identified state or federal endangered or threatened species habitat shall be coordinated with the appropriate WRC, USFWS, NMFS, and/or DMF personnel.

6. Work in the Dry

All work in or adjacent to stream waters shall be conducted so that the flowing stream does not come in contact with the disturbed area. Approved best management practices from the most current version of the NC Sediment and Erosion Control Manual, or the NC DOT Construction and Maintenance Activities Manual, such as sandbags, rock berms, cofferdams, and other diversion structures shall be used to minimize excavation in flowing water. Exceptions to this condition require application submittal to and written approval by the Division.

7. Riparian Area Protection (Buffer) Rules

Activities located in the protected riparian areas (whether jurisdictional wetlands or not), within the Neuse, Tar-Pamlico, or Catawba River Basins or in the Randleman, Jordan, or Goose Creek Watersheds (or any other basin or watershed with buffer rules) shall be limited to "uses" identified within and constructed in accordance with 15A NCAC 02B .0233, .0259, .0243, .0250, .0267 and .0605, and shall be located, designed, constructed, and maintained to have minimal disturbance to protect water quality to the maximum extent practicable through the use of best management practices. All buffer rule requirements, including diffuse flow requirements, must be met.

8. If concrete is used during the construction, then all necessary measures shall be taken to prevent direct contact between uncured or curing concrete and waters of the state. Water that inadvertently contacts uncured concrete shall not be discharged to waters of the state due to the potential for elevated pH and possible aquatic life/ fish kills.

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9. Bridge deck drains shall not discharge directly into the stream. Stormwater shall be directed across the bridge and pre-treated through site-appropriate means (grassed swales, pre-formed scour holes, vegetated buffers, etc.) before entering the stream. Please refer to the most current version of *Stormwater Best Management Practices*. Exceptions to this condition require written approval by the Division.

10. Relocated stream designs should include the same dimensions, patterns, and profiles as the existing channel (or a stable reference reach if the existing channel is unstable), to the maximum extent practical. The new channel should be constructed in the dry and water shall not be turned into the new channel until the banks are stabilized. Vegetation used for bank stabilization shall be limited to native woody species, and should include establishment of a 30-foot wide wooded and an adjacent 20-foot wide vegetated buffer on both sides of the relocated channel to the maximum extent practical. A transitional phase incorporating appropriate erosion control matting materials and seedling establishment is allowable, however matting that incorporates plastic mesh and/or plastic twine shall not be used in wetlands, riparian buffers or floodplains as recommended by the North Carolina Sediment and Erosion Control Manual. Rip-rap, A-Jacks, concrete, gabions or other hard structures may be allowed if it is necessary to maintain the physical integrity of the stream; however, the applicant must provide written justification and any calculations used to determine the extent of rip-rap coverage. Please note that if the stream relocation is conducted as a stream restoration as defined in the US Army Corps of Engineers Wilmington District, April 2003 *Stream Mitigation Guidelines* (or its subsequent updates), the restored length may be used as compensatory mitigation for the impacts resulting from the relocation.

11. Placement of Culverts and Other Structures in Waters and Wetlands

    Culverts required for this project shall be designed and installed in such a manner that the original stream profiles are not altered and allow for aquatic life movement during low flows. Existing stream dimensions (including the cross section dimensions, pattern, and longitudinal profile) must be maintained above and below locations of each culvert.

    Placement of culverts and other structures in waters and streams must be below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than or equal to 48 inches, to allow low flow passage of water and aquatic life.

    When topographic constraints indicate culvert slopes of greater than 5%, culvert burial is not required, provided that all alternative options for flattening the slope have been investigated and aquatic life movement/ connectivity has been provided when possible (rock ladders, crossvanes, etc). Notification to the Division including supporting documentation to include a location map of the culvert, culvert profile drawings, and slope calculations shall be provided to the Division 60 days prior to the installation of the culvert.

    When bedrock is present in culvert locations, culvert burial is not required provided that there is sufficient documentation of the presence of bedrock. Notification to the Division including supporting documentation such as, but not limited to, a location map of the culvert, geotechnical reports, photographs, etc shall be provided to the Division a minimum of 60 days prior to the installation of the culvert. If bedrock is discovered during construction, then the Division shall be notified by phone or email within 24 hours of discovery.

    If other site-specific topographic constraints preclude the ability to bury the culverts as described above and/or it can be demonstrated that burying the culvert would result in destabilization of the channel, then exceptions to this condition require application submittal to, and written approval by, the Division of Water Quality, regardless of the total impacts to streams or wetlands from the project.

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Installation of culverts in wetlands must ensure continuity of water movement and be designed to adequately accommodate high water or flood conditions. Additionally, when roadways, causeways, or other fill projects are constructed across FEMA-designated floodways or wetlands, openings such as culverts or bridges must be provided to maintain the natural hydrology of the system as well as prevent constriction of the floodway that may result in destabilization of streams or wetlands.

The establishment of native, woody vegetation and other soft stream bank stabilization techniques must be used where practicable instead of riprap or other bank hardening methods.

* 12. Compensatory Mitigation

In accordance with 15A NCAC 02H .0506 (h), compensatory mitigation may be required for losses of equal to or greater than 150 linear feet of streams (intermittent and perennial) and/or equal to or greater than one (1) acre of wetlands. For linear public transportation projects, impacts equal to or exceeding 150 linear feet per stream shall require mitigation.

Buffer mitigation may be required for any project with Buffer Rules in effect at the time of application for activities classified as "Allowable with Mitigation" or "Prohibited" within the Table of Uses.

A determination of buffer, wetland, and stream mitigation requirements shall be made for any General Water Quality Certification for this Nationwide and/or Regional General Permit. Design and monitoring protocols shall follow the US Army Corps of Engineers Wilmington District *Stream Mitigation Guidelines* (April 2003) or its subsequent updates. Compensatory mitigation plans shall be submitted to the Division for written approval as required in those protocols. The mitigation plan must be implemented and/or constructed before any impacts occur on site. Alternatively, the Division will accept payment into an in-lieu fee program or a mitigation bank. In these cases, proof of payment shall be provided to the Division before any impacts occur on site.

* 13. If an environmental document is required under the National or State Environmental Policy Act (NEPA or SEPA), then this General Certification is not valid until a Finding of No Significant Impact (FONSI) or Record of Decision (ROD) is issued by the State Clearinghouse.

14. In the twenty (20) coastal counties, the appropriate DWQ Regional Office must be contacted to determine if Coastal Stormwater Regulations will be required.

15. This General Certification does not relieve the applicant of the responsibility to obtain all other required Federal, State, or Local approvals.

16. The applicant/permittee and their authorized agents shall conduct all activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act), and any other appropriate requirements of State and Federal Law. If the Division determines that such standards or laws are not being met, including failure to sustain a designated or achieved use, or that State or Federal law is being violated, or that further conditions are necessary to assure compliance, then the Division may reevaluate and modify this General Water Quality Certification.

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* 17. When written authorization is required for use of this certification, upon completion of all permitted impacts included within the approval and any subsequent modifications, the applicant shall be required to return the certificate of completion attached to the approval. One copy of the certificate shall be sent to the DWQ Central Office in Raleigh at 1650 Mail Service Center, Raleigh, NC, 27699-1650.

18. Additional site-specific conditions, including monitoring and/or modeling requirements, may be added to the written approval letter for projects proposed under this Water Quality Certification in order to ensure compliance with all applicable water quality and effluent standards.

19. This certification grants permission to the director, an authorized representative of the Director, or DENR staff, upon the presentation of proper credentials, to enter the property during normal business hours.

This General Certification shall expire on the same day as the expiration date of the corresponding Nationwide and/or Regional General Permit. The conditions in effect on the date of issuance of Certification for a specific project shall remain in effect for the life of the project, regardless of the expiration date of this Certification.

Non-compliance with or violation of the conditions herein set forth by a specific project may result in revocation of this General Certification for the project and may also result in criminal and/or civil penalties.

The Director of the North Carolina Division of Water Quality may require submission of a formal application for Individual Certification for any project in this category of activity if it is determined that the project is likely to have a significant adverse effect upon water quality, including state or federally listed endangered or threatened aquatic species, or degrade the waters so that existing uses of the wetland or downstream waters are precluded.

Public hearings may be held for specific applications or group of applications prior to a Certification decision if deemed in the public's best interest by the Director of the North Carolina Division of Water Quality.

Effective date: March 19, 2012

DIVISION OF WATER QUALITY

By

Charles Wakild, P.E.

Director

History Note: Water Quality Certification (WQC) Number 3891 issued March 19, 2012 replaces WQC 3701 issued November 1, 2007; WQC Number 3632 issued March 2007; WQC Number 3403 issued March 2003; WQC Number 3361 issued March 18, 2002; WQC Number 3107 issued February 11, 1997; WQC Number 2734 issued May 1 1993; and WQC Number 2670 issued on January 21, 1992. This General Certification is rescinded when the Corps of Engineers reauthorizes any of the corresponding Nationwide and/or Regional General Permits or when deemed appropriate by the Director of the Division of Water Quality.

Water Quality Certification No. 3893

GENERAL CERTIFICATION FOR PROJECTS ELIGIBLE FOR U.S. ARMY CORPS OF ENGINEERS NATIONWIDE PERMIT NUMBER 33 (TEMPORARY CONSTRUCTION, ACCESS AND DEWATERING) AND RIPARIAN AREA PROTECTION RULES (BUFFER RULES)

Water Quality Certification Number 3893 is issued in conformity with the requirements of Section 401, Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Quality Regulations in 15A NCAC 02H .0500 and 15A NCAC 02B .0200 for the discharge of fill material to waters and wetland areas as described in 33 CFR 330 Appendix A (B) (33) and for the Riparian Area Protection Rules (Buffer Rules) in 15A NCAC 02B .0200.

The State of North Carolina certifies that the specified category of activity will not violate applicable portions of Sections 301, 302, 303, 306 and 307 of the Public Laws 92-500 and 95-217 if conducted in accordance with the conditions hereinafter set forth.

Activities meeting any one (1) of the following thresholds or circumstances require *written approval* for a 401 Water Quality Certification from the Division of Water Quality (the "Division"):

a. Any stream relocation; or
b. Any impact associated with a Notice of Violation or an enforcement action for violation(s) of DWQ Wetland Rules (15A NCAC 02H .0500), Isolated Wetland Rules (15A NCAC 02H .1300), DWQ Surface Water or Wetland Standards, or Riparian Buffer Rules (15A NCAC 02B .0200); or
* c. Any impacts to streams and/or buffers in the Neuse, Tar-Pamlico, or Catawba River Basins or in the Randleman, Jordan or Goose Creek Watersheds (or any other basin or watershed with Riparian Area Protection Rules [Buffer Rules] in effect at the time of application) *unless* the activities are listed as "EXEMPT" from these rules or a Buffer Authorization Certificate is issued through N.C. Division of Coastal Management (DCM) delegation for "ALLOWABLE" activities.

* In accordance with North Carolina General Statute 143-215.3D(e), written approval for a 401 Water Quality General Certification must include the appropriate fee. If a project also requires a CAMA Permit, then one payment to both agencies shall be submitted and will be the higher of the two fees.

Activities included in this General Certification that do not meet one of the thresholds listed above do not require written approval from the Division as long as they comply with the Conditions of Certification listed below. If any of these Conditions cannot be met, then written approval from the Division is required.

Conditions of Certification:

1. No Impacts Beyond those Authorized in the Written Approval or Beyond the Threshold of Use of this Certification

   No waste, spoil, solids, or fill of any kind shall occur in wetlands, waters, or riparian areas beyond the footprint of the impacts depicted in the Pre-Construction Notification, as authorized in the written approval from the Division or beyond the thresholds established for use of this Certification without written authorization, including incidental impacts. All construction activities, including the design, installation, operation, and maintenance of sediment and erosion control Best Management Practices shall be performed so that no violations of state water quality standards, statutes, or rules occur. Approved plans and specifications for this project are incorporated by reference and are enforceable parts of this permit.

Water Quality Certification No. 3893

2. Standard Erosion and Sediment Control Practices

   Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices and if applicable, comply with the specific conditions and requirements of the NPDES Construction Stormwater Permit issued to the site:

   a. Design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal or exceed the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual*. The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.

   b. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual*.

   c. Reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act and the Mining Act of 1971.

   d. Sufficient materials required for stabilization and/or repair of erosion control measures and stormwater routing and treatment shall be on site at all times.

   e. If the project occurs in waters or watersheds classified as Primary Nursery Areas (PNAs), SA, WS-I, WS-II, High Quality (HQW), or Outstanding Resource (ORW) waters, then the sedimentation and erosion control designs must comply with the requirements set forth in 15A NCAC 04B .0124, *Design Standards in Sensitive Watersheds*.

3. No Sediment and Erosion Control Measures in Wetlands or Waters

   Sediment and erosion control measures shall not be placed in wetlands or waters. Exceptions to this condition require application submittal to and written approval by the Division. If placement of sediment and erosion control devices in wetlands and waters is unavoidable, then design and placement of temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands, stream beds, or banks, adjacent to or upstream and downstream of the above structures. All sediment and erosion control devices shall be removed and the natural grade restored within two (2) months of the date that the Division of Land Resources (DLR) or locally delegated program has released the specific area within the project.

4. Construction Stormwater Permit NCG010000

   An NPDES Construction Stormwater Permit is required for construction projects that disturb one (1) or more acres of land. This Permit allows stormwater to be discharged during land disturbing construction activities as stipulated in the conditions of the permit. If your project is covered by this permit, full compliance with permit conditions including the erosion & sedimentation control plan, inspections and maintenance, self-monitoring, record keeping and reporting requirements is required. A copy of the general permit (NCG010000), inspection log sheets, and other information may be found at http://portal.ncdenr.org/web/wq/ws/su/npdessw#tab-w .

   The North Carolina Department of Transportation (NCDOT) shall be required to be in full compliance with the conditions related to construction activities within the most recent version of their individual NPDES (NCS000250) stormwater permit.

Water Quality Certification No. 3893

5. Construction Moratoriums and Coordination

   If activities must occur during periods of high biological activity (i.e. sea turtle nesting, fish spawning, or bird nesting), then biological monitoring may be required at the request of other state or federal agencies and coordinated with these activities.

   All moratoriums on construction activities established by the NC Wildlife Resources Commission (WRC), US Fish and Wildlife Service (USFWS), NC Division of Marine Fisheries (DMF), or National Marine Fisheries Service (NMFS) to lessen impacts on trout, anadromous fish, larval/post-larval fishes and crustaceans, or other aquatic species of concern shall be implemented. Exceptions to this condition require written approval by the resource agency responsible for the given moratorium.

   Work within the twenty-five (25) designated trout counties or identified state or federal endangered or threatened species habitat shall be coordinated with the appropriate WRC, USFWS, NMFS, and/or DMF personnel.

6. Work in the Dry

   All work in or adjacent to stream waters shall be conducted so that the flowing stream does not come in contact with the disturbed area. Approved best management practices from the most current version of the NC Sediment and Erosion Control Manual, or the NC DOT Construction and Maintenance Activities Manual, such as sandbags, rock berms, cofferdams, and other diversion structures shall be used to minimize excavation in flowing water. Exceptions to this condition require application submittal to and written approval by the Division.

7. Riparian Area Protection (Buffer) Rules

   Activities located in the protected riparian areas (whether jurisdictional wetlands or not), within the Neuse, Tar-Pamlico, or Catawba River Basins or in the Randleman, Jordan, or Goose Creek Watersheds (or any other basin or watershed with buffer rules) shall be limited to "uses" identified within and constructed in accordance with 15A NCAC 02B .0233, .0259, .0243, .0250, .0267 and .0605, and shall be located, designed, constructed, and maintained to have minimal disturbance to protect water quality to the maximum extent practicable through the use of best management practices. All buffer rule requirements, including diffuse flow requirements, must be met.

8. If concrete is used during the construction, then all necessary measures shall be taken to prevent direct contact between uncured or curing concrete and waters of the state. Water that inadvertently contacts uncured concrete shall not be discharged to waters of the state due to the potential for elevated pH and possible aquatic life/ fish kills.

9. Bridge deck drains shall not discharge directly into the stream. Stormwater shall be directed across the bridge and pre-treated through site-appropriate means (grassed swales, pre-formed scour holes, vegetated buffers, etc.) before entering the stream. Please refer to the most current version of *Stormwater Best Management Practices.* Exceptions to this condition require written approval by the Division.

10. Placement of culverts and other structures in Waters and Wetlands

    Culverts required for this project shall be designed and installed in such a manner that the original stream profiles are not altered and allow for aquatic life movement during low flows. Existing stream dimensions (including the cross section dimensions, pattern, and longitudinal profile) must be maintained above and below locations of each culvert.

Water Quality Certification No. 3893

Placement of culverts and other structures in waters and streams must be below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than or equal to 48 inches, to allow low flow passage of water and aquatic life.

When topographic constraints indicate culvert slopes of greater than 5%, culvert burial is not required, provided that all alternative options for flattening the slope have been investigated and aquatic life movement/ connectivity has been provided when possible (rock ladders, crossvanes, etc). Notification to the Division including supporting documentation to include a location map of the culvert, culvert profile drawings, and slope calculations shall be provided to the Division 60 days prior to the installation of the culvert.

When bedrock is present in culvert locations, culvert burial is not required provided that there is sufficient documentation of the presence of bedrock. Notification to the Division including supporting documentation such as, but not limited to, a location map of the culvert, geotechnical reports, photographs, etc shall be provided to the Division a minimum of 60 days prior to the installation of the culvert. If bedrock is discovered during construction, then the Division shall be notified by phone or email within 24 hours of discovery.

If other site-specific topographic constraints preclude the ability to bury the culverts as described above and/or it can be demonstrated that burying the culvert would result in destabilization of the channel, then exceptions to this condition require application submittal to, and written approval by, the Division of Water Quality, regardless of the total impacts to streams or wetlands from the project.

Installation of culverts in wetlands must ensure continuity of water movement and be designed to adequately accommodate high water or flood conditions. Additionally, when roadways, causeways, or other fill projects are constructed across FEMA-designated floodways or wetlands, openings such as culverts or bridges must be provided to maintain the natural hydrology of the system as well as prevent constriction of the floodway that may result in destabilization of streams or wetlands.

The establishment of native, woody vegetation and other soft stream bank stabilization techniques must be used where practicable instead of riprap or other bank hardening methods.

* 11. Compensatory Mitigation

In accordance with 15A NCAC 02H .0506 (h), compensatory mitigation may be required for losses of equal to or greater than 150 linear feet of streams (intermittent and perennial) and/or equal to or greater than one (1) acre of wetlands. For linear public transportation projects, impacts equal to or exceeding 150 linear feet per stream shall require mitigation.

Buffer mitigation may be required for any project with Buffer Rules in effect at the time of application for activities classified as "Allowable with Mitigation" or "Prohibited" within the Table of Uses.

A determination of buffer, wetland, and stream mitigation requirements shall be made for any General Water Quality Certification for this Nationwide and/or Regional General Permit. Design and monitoring protocols shall follow the US Army Corps of Engineers Wilmington District *Stream Mitigation Guidelines* (April 2003) or its subsequent updates. Compensatory mitigation plans shall be submitted to the Division for written approval as required in those protocols. The mitigation plan must be implemented and/or constructed before any impacts occur on site. Alternatively, the Division will accept payment into an in-lieu fee program or a mitigation bank. In these cases, proof of payment shall be provided to the Division before any impacts occur on site.

Water Quality Certification No. 3893

12. Relocated stream designs should include the same dimensions, patterns, and profiles as the existing channel (or a stable reference reach if the existing channel is unstable), to the maximum extent practical. The new channel should be constructed in the dry and water shall not be turned into the new channel until the banks are stabilized. Vegetation used for bank stabilization shall be limited to native woody species, and should include establishment of a 30-foot wide wooded and an adjacent 20-foot wide vegetated buffer on both sides of the relocated channel to the maximum extent practical. A transitional phase incorporating appropriate erosion control matting materials and seedling establishment is allowable, however matting that incorporates plastic mesh and/or plastic twine shall not be used in wetlands, riparian buffers or floodplains as recommended by the North Carolina Sediment and Erosion Control Manual. Rip-rap, A-Jacks, concrete, gabions or other hard structures may be allowed if it is necessary to maintain the physical integrity of the stream; however, the applicant must provide written justification and any calculations used to determine the extent of rip-rap coverage. Please note that if the stream relocation is conducted as a stream restoration as defined in the US Army Corps of Engineers Wilmington District, April 2003 *Stream Mitigation Guidelines* (or its subsequent updates), the restored length may be used as compensatory mitigation for the impacts resulting from the relocation.

13. All temporary fill and culverts shall be removed and the impacted area returned to natural conditions within 60 days of the determination that the temporary impact is no longer necessary. The impacted areas shall be restored to original grade, including each stream's original cross sectional dimensions, plan form pattern, and longitudinal bed and bed profile, and the various sites shall be stabilized with natural woody vegetation (except for the approved maintenance areas) and restored to prevent erosion.

14. Pipes shall be installed under the road or causeway in all streams to carry at least the 25-year storm event as outlined in the most recent edition of the *North Carolina Sediment and Erosion Control Planning and Design Manual* or the *North Carolina Surface Mining Manual* so as not to restrict stream flow during use of this General Certification.

* 15. If an environmental document is required under the National or State Environmental Policy Act (NEPA or SEPA), then this General Certification is not valid until a Finding of No Significant Impact (FONSI) or Record of Decision (ROD) is issued by the State Clearinghouse.

16. In the twenty (20) coastal counties, the appropriate DWQ Regional Office must be contacted to determine if Coastal Stormwater Regulations will be required.

17. This General Certification does not relieve the applicant of the responsibility to obtain all other required Federal, State, or Local approvals.

18. The applicant/permittee and their authorized agents shall conduct all activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act), and any other appropriate requirements of State and Federal Law. If the Division determines that such standards or laws are not being met, including failure to sustain a designated or achieved use, or that State or Federal law is being violated, or that further conditions are necessary to assure compliance, then the Division may reevaluate and modify this General Water Quality Certification.

* 19. When written authorization is required for use of this certification, upon completion of all permitted impacts included within the approval and any subsequent modifications, the applicant shall be required to return the certificate of completion attached to the approval. One copy of the certificate shall be sent to the DWQ Central Office in Raleigh at 1650 Mail Service Center, Raleigh, NC, 27699-1650.

Water Quality Certification No. 3893

20. Additional site-specific conditions, including monitoring and/or modeling requirements, may be added to the written approval letter for projects proposed under this Water Quality Certification in order to ensure compliance with all applicable water quality and effluent standards.

21. This certification grants permission to the director, an authorized representative of the Director, or DENR staff, upon the presentation of proper credentials, to enter the property during normal business hours.

This General Certification shall expire on the same day as the expiration date of the corresponding Nationwide and/or Regional General Permit. The conditions in effect on the date of issuance of Certification for a specific project shall remain in effect for the life of the project, regardless of the expiration date of this Certification.

Non-compliance with or violation of the conditions herein set forth by a specific project may result in revocation of this General Certification for the project and may also result in criminal and/or civil penalties.

The Director of the North Carolina Division of Water Quality may require submission of a formal application for Individual Certification for any project in this category of activity if it is determined that the project is likely to have a significant adverse effect upon water quality, including state or federally listed endangered or threatened aquatic species, or degrade the waters so that existing uses of the wetland or downstream waters are precluded.

Public hearings may be held for specific applications or group of applications prior to a Certification decision if deemed in the public's best interest by the Director of the North Carolina Division of Water Quality.

Effective date: March 19, 2012

DIVISION OF WATER QUALITY

By

Max Martin for

Charles Wakild, P.E.

Director

History Note: Water Quality Certification (WQC) Number 3893 issued March 19, 2012 replaces WQC Number 3688 issued November 1, 2007; WQC Number 3634 issued March 19, 2007; WQC Number 3366 issued March 18, 2002; WQC Number 3114 issued February 11, 1997; and WQC Number 2727 issued May 1, 1992. This General Certification is rescinded when the Corps of Engineers reauthorizes any of the corresponding Nationwide and/or Regional General Permits or when deemed appropriate by the Director of the Division of Water Quality.

TIP PROJECT: K-5002

CONTRACT:

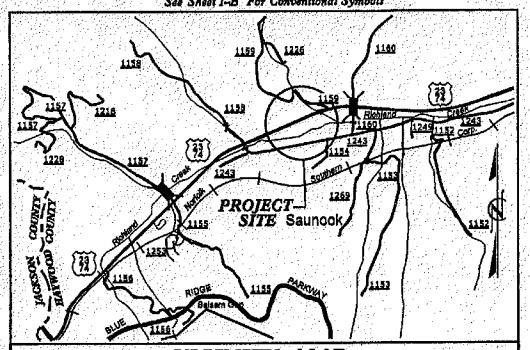
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

HAYWOOD COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	K-5002	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
41534.1.1	NHS-0023(18)	P.E.
41534.2.1	NHS-0023(18)	R/W

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



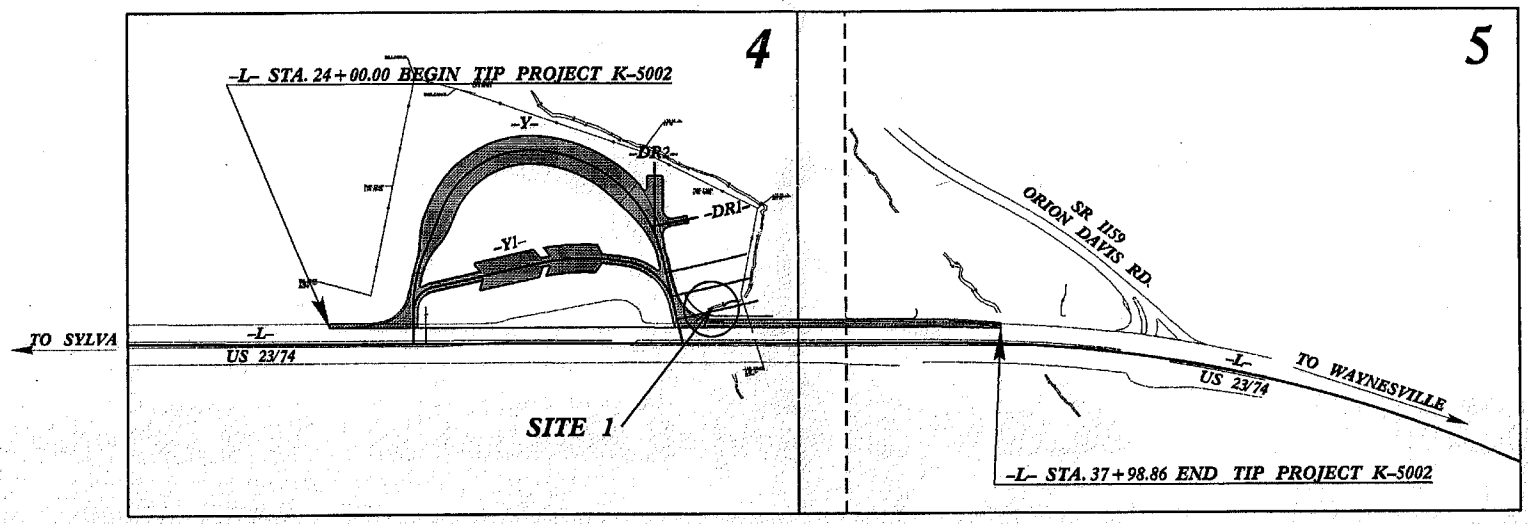
VICINITY MAP

LOCATION: US 23/74 – SOUTHBOUND REST AREA ON NEW LOCATION AS A COMPANION TO THE EXISTING NORTHBOUND REST AREA

TYPE OF WORK: GRADING, PAVING, DRAINAGE, TRAFFIC CONTROL AND SIGNING

NAD 83/ NSRS 2007

WETLAND AND SURFACE WATER IMPACTS



THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2013 = 760
ADT 2033 = 1,160
DHV = 13%
D = 55%
T = N/A%
V = 20 MPH

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT K-5002 = 0.265 MILES
TOTAL LENGTH TIP PROJECT K-5002 = 0.265 MILES

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: AUGUST 29, 2012

LETTING DATE: AUGUST 20, 2013

JIMMY GOODNIGHT, P.E.
PROJECT ENGINEER

MARK HUSSEY
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

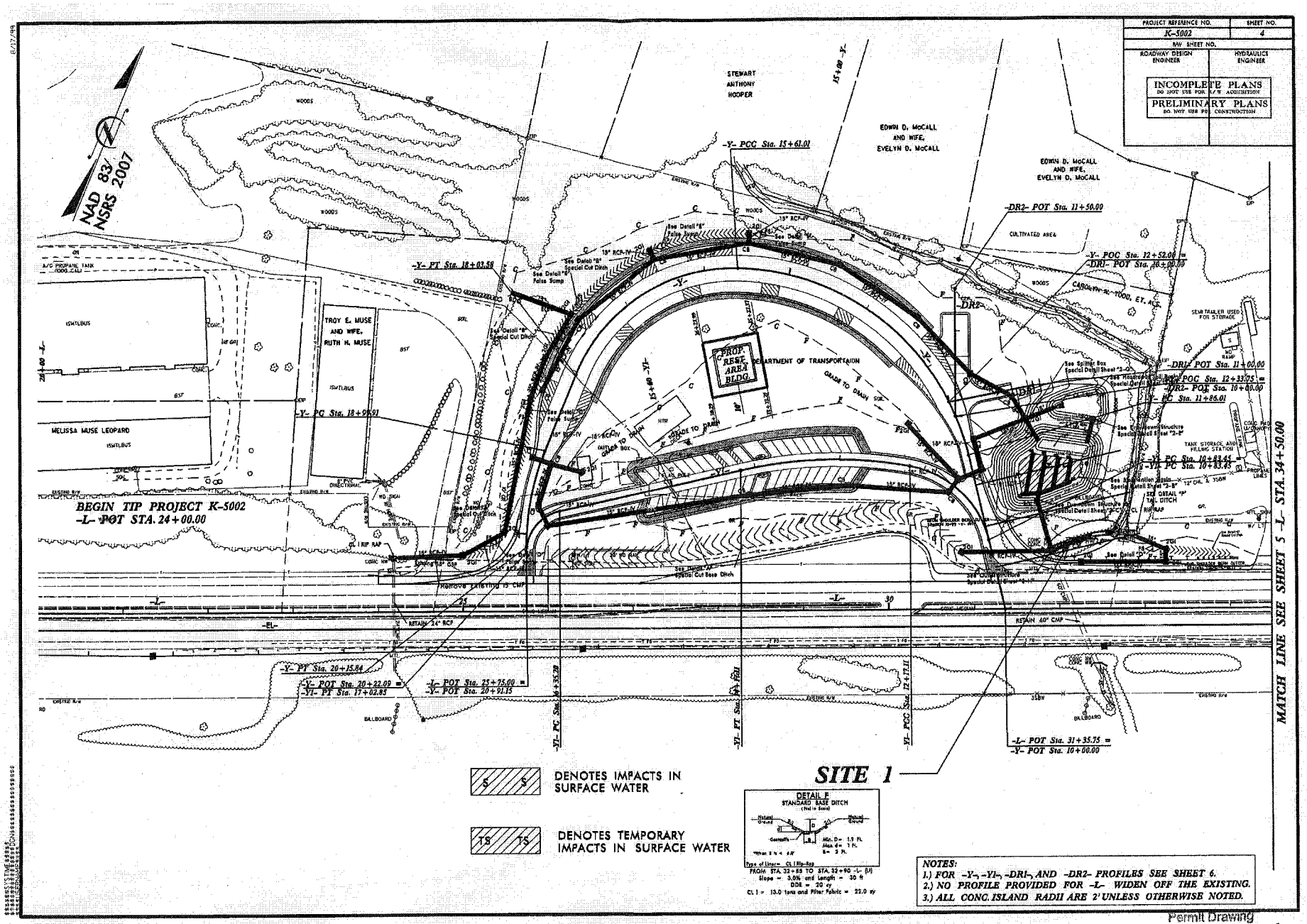
STATE HIGHWAY DESIGN ENGINEER P.E.

Sheet ___ of ___

R-63

PROJECT REFERENCE NO.	SHEET NO.
K-5002	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

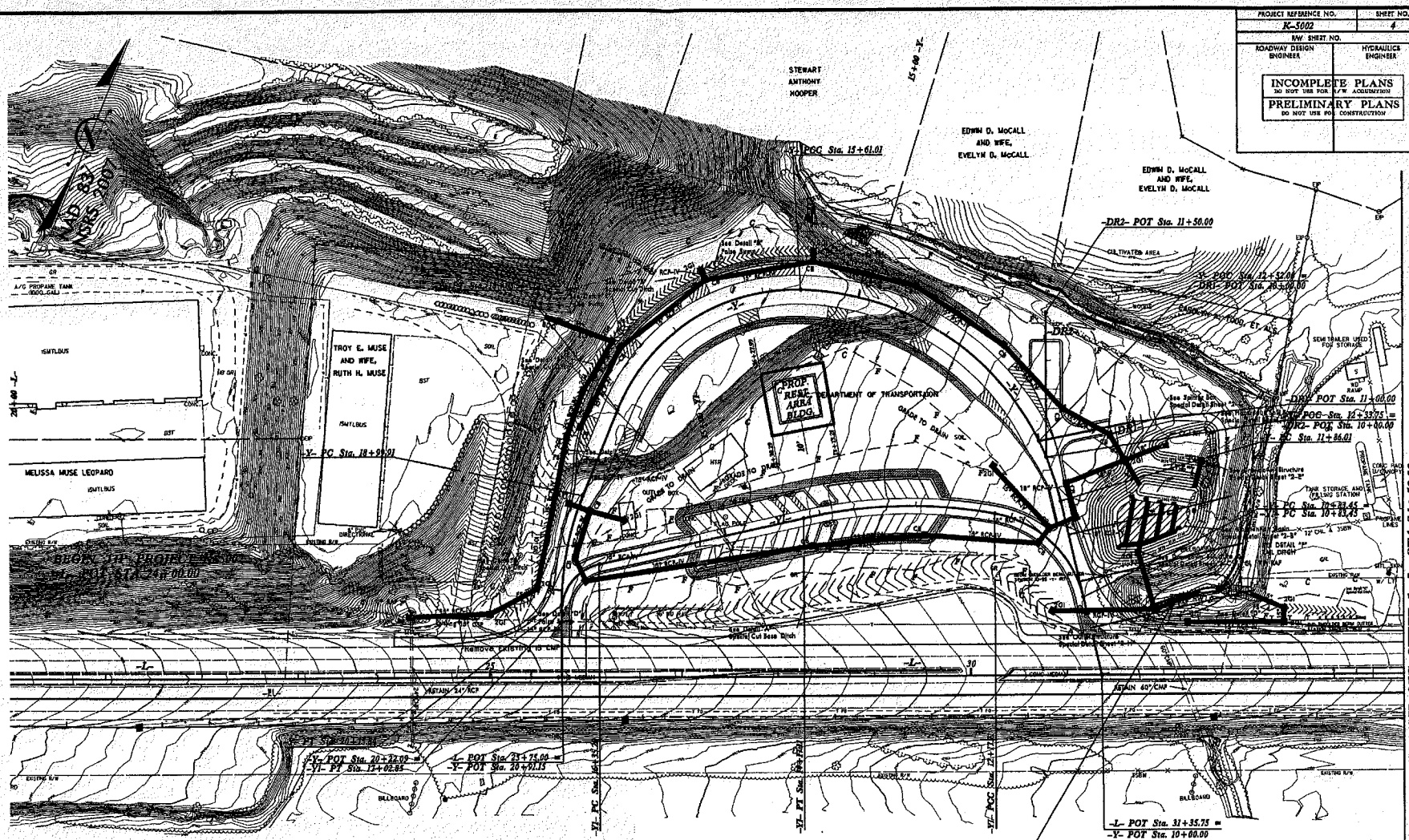


Permit Drawing
Sheet 2 of 6

PROJECT REFERENCE NO.	SHEET NO.
R-5002	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SITE 1

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL F
STANDARD BASE DITCH
(Not to Scale)

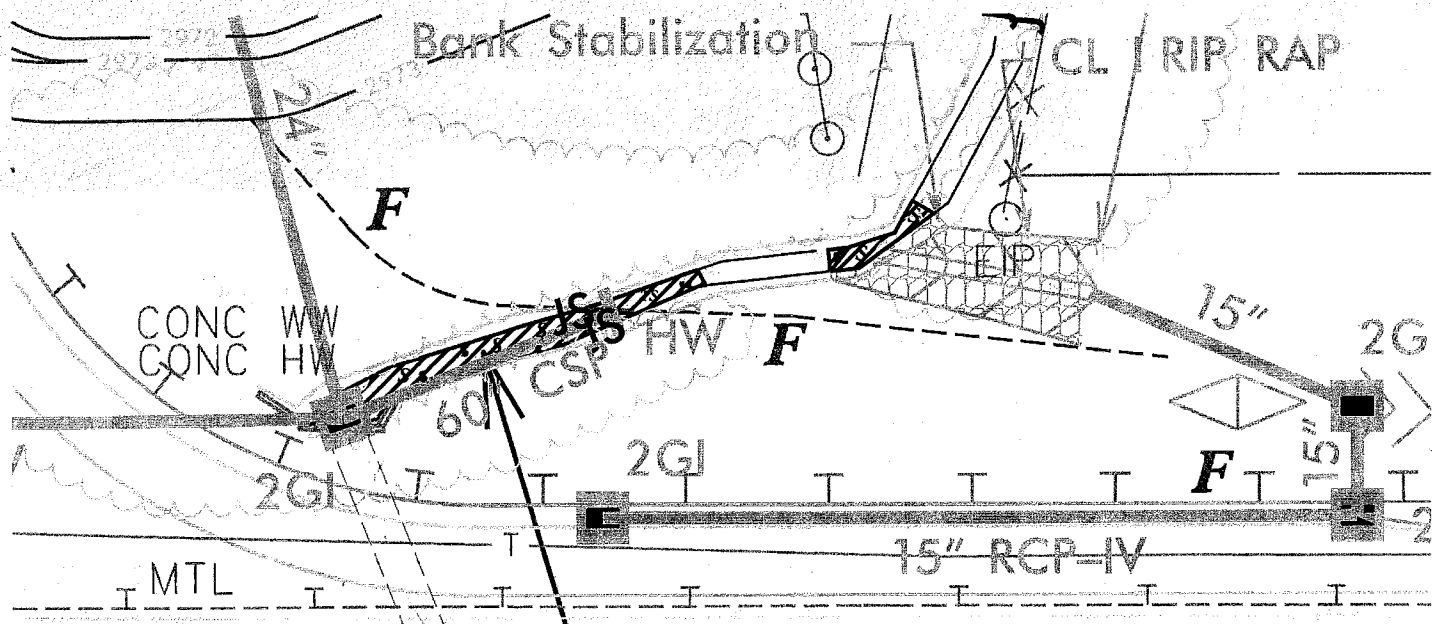
Min. D = 1.5 ft.
Max. d = 1 ft.
B = 3 ft.

*When b is < 4.0'

Type of Liner = Cl I Rip-Rap
FROM STA. 32+68 TO STA. 32+90 -L- (U)
Slope = 3.0% and Length = 30 ft
DOB = 20 cy
Cl I = 15.0 tons and Filter Fabric = 23.0 sy

NOTES:
1.) FOR -Y-, -YI-, -DR1-, AND -DR2- PROFILES SEE SHEET 6.
2.) NO PROFILE PROVIDED FOR -L- WIDEN OFF THE EXISTING.
3.) ALL CONC. ISLAND RADII ARE 2' UNLESS OTHERWISE NOTED.

Permit Drawing
Sheet 3 of 6



DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SITE 1

PLAN VIEW

SCALE 1" = 20'

NCDOT
DIVISION OF HIGHWAYS
HAYWOOD COUNTY
PROJECT: 41534.1.1 (K-5002)
WAYNESVILLE
US23/74 - SOUTHBOUND REST AREA
NEW LOCATION

SHEET 1 OF 1 **09/21/12**

Permit Drawing
Sheet 4 of 6

PROPERTY OWNERS

NAMES AND ADDRESSES

SITE NO.	PARCEL NO.	NAMES	ADDRESSES
1		NC DOT	

NCDOT

DIVISION OF HIGHWAYS

HAYWOOD COUNTY

PROJECT: 41534.1.1 (K-5002)

WAYNESVILLE

US23/74 - SOUTHBOUND REST AREA

NEW LOCATION

SHEET 1 OF 1 09/21/12

Permit Drawing

Sheet 5 of 6

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	31+86 to 32+39 -L- (Lt)	60" CMP						<0.01	<0.01	39	13	
	32+55 to 32+71 -L- (Lt)	Bank Stabilization						<0.01		15		
TOTALS:								<0.01	<0.01	54.000	13.000	

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

Haywood
WBS - 41534.1.1 (K-5002)

SHEET 1 #########

ATN Revised 3/31/05

Permit Drawing
Sheet 6 of 6

R-68

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Energy, Mineral, and Land Resources
Tracy E. Davis, PE, CPM
Director
Land Quality Section
Pat McCrory, Governor
John E. Skvarla, III, Secretary

November 19, 2013

Mr. Barney Blackburn, PE
Soil & Water Engineering Supervisor
N C Department of Transportation
Roadside Environmental Unit
1557 Mail Service Center
Raleigh, NC 27699-1557

Subject: Trout Buffer Zone Waiver
US 23/74 Southbound Rest Area
TIP Project K-5002
Haywood County

Dear Mr. Blackburn:

This office has received your plan for US 23/74 Southbound Rest Area in Haywood County, North Carolina. Your plan was submitted to this office for approval because of the proposed encroachments into the buffer zone of designated trout waters. In accordance with NCGS 113A-57(1) and Title 15A NCAC 4B .0125(c) this letter will serve as written approval to encroach on the buffer zone of an Unnamed Tributary to Richland Creek, Class B, Trout. This authority has been delegated to me by Tracy E. Davis, Director, Division of Energy, Mineral and Land Resources, in accordance with NCGS 143B-10. The following conditions will apply to this approval:

1. This approval is based on the plans received November 6, 2013.

2. Submit two (2) complete sets of final plans to the Asheville Regional Office for their files.

3. Schedule a Preconstruction Conference with the Asheville Regional Office before initiating any land-disturbing activity.

4. This approval does not absolve the permittee from compliance with the surface water quality turbidity standard. More protective erosion and sedimentation control measures may be required in order to comply with this water quality standard.

Your cooperation in protecting our environment is most appreciated. If you have any questions about this approval, please contact me at gray.hauser@ncdenr.gov or (919) 707-9215.

Sincerely,

T. Gray Hauser, Jr., PE
State Sedimentation Specialist

cc: Laura Herbert, PE, Asheville Regional Engineer

STANDARD SPECIAL PROVISION
AVAILABILITY OF FUNDS – TERMINATION OF CONTRACTS

(5-20-08) Z-2

General Statute 143C-6-11. (h) Highway Appropriation is hereby incorporated verbatim in this contract as follows:

(h) Amounts Encumbered. – Transportation project appropriations may be encumbered in the amount of allotments made to the Department of Transportation by the Director for the estimated payments for transportation project contract work to be performed in the appropriation fiscal year. The allotments shall be multiyear allotments and shall be based on estimated revenues and shall be subject to the maximum contract authority contained in *General Statute 143C-6-11(c)*. Payment for transportation project work performed pursuant to contract in any fiscal year other than the current fiscal year is subject to appropriations by the General Assembly. Transportation project contracts shall contain a schedule of estimated completion progress, and any acceleration of this progress shall be subject to the approval of the Department of Transportation provided funds are available. The State reserves the right to terminate or suspend any transportation project contract, and any transportation project contract shall be so terminated or suspended if funds will not be available for payment of the work to be performed during that fiscal year pursuant to the contract. In the event of termination of any contract, the contractor shall be given a written notice of termination at least 60 days before completion of scheduled work for which funds are available. In the event of termination, the contractor shall be paid for the work already performed in accordance with the contract specifications.

Payment will be made on any contract terminated pursuant to the special provision in accordance with Subarticle 108-13(E) of the *2012 Standard Specifications*.

STANDARD SPECIAL PROVISION
NCDOT GENERAL SEED SPECIFICATION FOR SEED QUALITY

(5-17-11) Z-3

Seed shall be sampled and tested by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory. When said samples are collected, the vendor shall supply an independent laboratory report for each lot to be tested. Results from seed so sampled shall be final. Seed not meeting the specifications shall be rejected by the Department of Transportation and shall not be delivered to North Carolina Department of Transportation warehouses. If seed has been delivered it shall be available for pickup and replacement at the supplier's expense.

Any re-labeling required by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory, that would cause the label to reflect as otherwise specified herein shall be rejected by the North Carolina Department of Transportation.

Seed shall be free from seeds of the noxious weeds Johnsongrass, Balloonvine, Jimsonweed, Witchweed, Itchgrass, Serrated Tussock, Showy Crotalaria, Smooth Crotalaria, Sicklepod, Sandbur, Wild Onion, and Wild Garlic. Seed shall not be labeled with the above weed species on the seed analysis label. Tolerances as applied by the Association of Official Seed Analysts will NOT be allowed for the above noxious weeds except for Wild Onion and Wild Garlic.

Tolerances established by the Association of Official Seed Analysts will generally be recognized. However, for the purpose of figuring pure live seed, the found pure seed and found germination percentages as reported by the North Carolina Department of Agriculture and Consumer Services, Seed Testing Laboratory will be used. Allowances, as established by the NCDOT, will be recognized for minimum pure live seed as listed on the following pages.

The specifications for restricted noxious weed seed refers to the number per pound as follows:

Restricted Noxious **Weed**	Limitations per Lb. Of Seed	Restricted Noxious **Weed**	Limitations per Lb. of Seed
Blessed Thistle	4 seeds	Cornflower (Ragged Robin)	27 seeds
Cocklebur	4 seeds	Texas Panicum	27 seeds
Spurred Anoda	4 seeds	Bracted Plantain	54 seeds
Velvetleaf	4 seeds	Buckhorn Plantain	54 seeds
Morning-glory	8 seeds	Broadleaf Dock	54 seeds
Corn Cockle	10 seeds	Curly Dock	54 seeds
Wild Radish	12 seeds	Dodder	54 seeds
Purple Nutsedge	27 seeds	Giant Foxtail	54 seeds
Yellow Nutsedge	27 seeds	Horsenettle	54 seeds
Canada Thistle	27 seeds	Quackgrass	54 seeds
Field Bindweed	27 seeds	Wild Mustard	54 seeds
Hedge Bindweed	27 seeds		

Seed of Pensacola Bahiagrass shall not contain more than 7% inert matter, Kentucky Bluegrass, Centipede and Fine or Hard Fescue shall not contain more than 5% inert matter whereas a maximum of 2% inert matter will be allowed on all other kinds of seed. In addition, all seed shall not contain more than 2% other crop seed nor more than 1% total weed seed. The germination rate as tested by the North Carolina Department of Agriculture shall not fall below 70%, which includes both dormant and hard seed. Seed shall be labeled with not more than 7%, 5% or 2% inert matter (according to above specifications), 2% other crop seed and 1% total weed seed.

Exceptions may be made for minimum pure live seed allowances when cases of seed variety shortages are verified. Pure live seed percentages will be applied in a verified shortage situation. Those purchase orders of deficient seed lots will be credited with the percentage that the seed is deficient.

FURTHER SPECIFICATIONS FOR EACH SEED GROUP ARE GIVEN BELOW:

Minimum 85% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 83% pure live seed will not be approved.

Sericea Lespedeza
Oats (seeds)

Minimum 80% pure live seed; maximum 1% total weed seed; maximum 2% total other crop; maximum 144 restricted noxious weed seed per pound. Seed less than 78% pure live seed will not be approved.

Tall Fescue (all approved varieties)
Kobe Lespedeza
Korean Lespedeza
Weeping Lovegrass
Carpetgrass
Bermudagrass
Browntop Millet
German Millet – Strain R
Clover – Red/White/Crimson

Minimum 78% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 76% pure live seed will not be approved.

Common or Sweet Sundangrass

Minimum 76% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 restricted noxious weed seed per pound. Seed less than 74% pure live seed will not be approved.

Rye (grain; all varieties)
Kentucky Bluegrass (all approved varieties)
Hard Fescue (all approved varieties)
Shrub (bicolor) Lespedeza

Minimum 70% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 144 noxious weed seed per pound. Seed less than 70% pure live seed will not be approved.

Centipedegrass
Crownvetch
Pensacola Bahiagrass
Creeping Red Fescue
Japanese Millet
Reed Canary Grass
Zoysia

Minimum 70% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 5% inert matter; maximum 144 restricted noxious weed seed per pound.

Barnyard Grass
Big Bluestem
Little Bluestem
Bristly Locust
Birdsfoot Trefoil
Indiangrass
Orchardgrass
Switchgrass
Yellow Blossom Sweet Clover

STANDARD SPECIAL PROVISION

ERRATA

(1-17-12) (Rev. 1-21-14) Z-4

Revise the *2012 Standard Specifications* as follows:

Division 2

Page 2-7, line 31, Article 215-2 Construction Methods, replace "Article 107-26 with "Article 107-25 .

Page 2-17, Article 226-3, Measurement and Payment, line 2, delete "pipe culverts, .

Page 2-20, Subarticle 230-4(B), Contractor Furnished Sources, change references as follows: Line 1, replace "(4) Buffer Zone with "(c) Buffer Zone ; **Line 12,** replace "(5) Evaluation for Potential Wetlands and Endangered Species with "(d) Evaluation for Potential Wetlands and Endangered Species ; and **Line 33,** replace "(6) Approval with "(4) Approval .

Division 3

Page 3-1, after line 15, Article 300-2 Materials, replace "1032-9(F) with "1032-6(F) .

Division 4

Page 4-77, line 27, Subarticle 452-3(C) Concrete Coping, replace "sheet pile with "reinforcement .

Division 6

Page 6-7, line 31, Article 609-3 Field Verification of Mixture and Job Mix Formula Adjustments, replace "30 with "45 .

Page 6-10, line 42, Subarticle 609-6(C)(2), replace "Subarticle 609-6(E) with "Subarticle 609-6(D) .

Page 6-11, Table 609-1 Control Limits, replace "Max. Spec. Limit for the Target Source of $P_{0.075}/P_{be}$ Ratio with "1.0 .

Page 6-40, Article 650-2 Materials, replace "Subarticle 1012-1(F) with "Subarticle 1012-1(E)

Division 8

Page 8-23, line 10, Article 838-2 Materials, replace "Portland Cement Concrete, Class B with "Portland Cement Concrete, Class A .

Division 12

Page 12-7, Table 1205-3, add "FOR THERMOPLASTIC to the end of the title.

Page 12-8, Subarticle 1205-5(B), line 13, replace "Table 1205-2 with "Table 1205-4 .

Page 12-8, Table 1205-4 and 1205-5, replace "THERMOPLASTIC in the title of these tables with "POLYUREA .

Page 12-9, Subarticle 1205-6(B), line 21, replace "Table 1205-4 with "Table 1205-6 .

Page 12-11, Subarticle 1205-8(C), line 25, replace "Table 1205-5 with "Table 1205-7 .

Division 15

Page 15-4, Subarticle 1505-3(F) Backfilling, line 26, replace "Subarticle 235-4(C) with "Subarticle 235-3(C) .

Page 15-6, Subarticle 1510-3(B), after line 21, replace the allowable leakage formula with the following: $\boldsymbol{W = LD\sqrt{P} \div 148,000}$

Page 15-6, Subarticle 1510-3(B), line 32, delete "may be performed concurrently or" and replace with "shall be performed".

Page 15-17, Subarticle 1540-3(E), line 27, delete "Type 1 .

Division 17

Page 17-26, line 42, Subarticle 1731-3(D) Termination and Splicing within Interconnect Center, delete this subarticle.

Revise the *2012 Roadway Standard Drawings* as follows:

1633.01 Sheet 1 of 1, English Standard Drawing for Matting Installation, replace "1633.01 with "1631.01 .

STANDARD SPECIAL PROVISION

PLANT AND PEST QUARANTINES
(Imported Fire Ant, Gypsy Moth, Witchweed, And Other Noxious Weeds)

(3-18-03) (Rev. 10-15-13) 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.gov/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.

STANDARD SPECIAL PROVISION

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 .

STANDARD SPECIAL PROVISION

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
Duplin County
Onslow County
Pender 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
Yancey 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

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%

STANDARD SPECIAL PROVISION

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.

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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.

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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.

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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.

STANDARD SPECIAL PROVISION

ON-THE-JOB TRAINING

(10-16-07) (Rev. 5-21-13) 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.ncbowd.com/section/on-the-job-training.

Training Classifications

The Contractor shall provide on-the-job training aimed at developing full journeyman level workers in the construction craft/operator positions. Preference shall be given to providing training in the following skilled work classifications:

Equipment Operators	Office Engineers
Truck Drivers	Estimators
Carpenters	Iron / Reinforcing Steel Workers
Concrete Finishers	Mechanics
Pipe Layers	Welders

The Department has established common training classifications and their respective training requirements that may be used by the contractors. However, the classifications established are not all-inclusive. Where the training is oriented toward construction applications, training will be allowed in lower-level management positions such as office engineers and estimators. Contractors shall submit new classifications for specific job functions that their employees are performing. The Department will review and recommend for acceptance to FHWA the new classifications proposed by contractors, if applicable. New classifications shall meet the following requirements:

Proposed training classifications are reasonable and realistic based on the job skill classification needs, and

The number of training hours specified in the training classification is consistent with common practices and provides enough time for the trainee to obtain journeyman level status.

The Contractor may allow trainees to be trained by a subcontractor provided that the Contractor retains primary responsibility for meeting the training and this provision is made applicable to the subcontract. However, only the Contractor will receive credit towards the annual goal for the trainee.

Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. The number of trainees shall be distributed among the work classifications on the basis of the contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment.

No employee shall be employed as a trainee in any classification in which they have successfully completed a training course leading to journeyman level status or in which they have been employed as a journeyman.

Records and Reports

The Contractor shall maintain enrollment, monthly and completion reports documenting company compliance under these contract documents. These documents and any other information as requested shall be submitted to the OJT Program Manager.

Upon completion and graduation of the program, the Contractor shall provide each trainee with a certification Certificate showing the type and length of training satisfactorily completed.

Trainee Interviews

All trainees enrolled in the program will receive an initial and Trainee/Post graduate interview conducted by the OJT program staff.

Trainee Wages

Contractors shall compensate trainees on a graduating pay scale based upon a percentage of the prevailing minimum journeyman wages (Davis-Bacon Act). Minimum pay shall be as follows:

60 percent	of the journeyman wage for the first half of the training period
75 percent	of the journeyman wage for the third quarter of the training period
90 percent	of the journeyman wage for the last quarter of the training period

In no instance shall a trainee be paid less than the local minimum wage. The Contractor shall adhere to the minimum hourly wage rate that will satisfy both the NC Department of Labor (NCDOL) and the Department.

Achieving or Failing to Meet Training Goals

The Contractor will be credited for each trainee employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and who receives training for at least 50 percent of the specific program requirement. Trainees will be allowed to be transferred between projects if required by the Contractor's scheduled workload to meet training goals.

If a contractor fails to attain their training assignments for the calendar year, they may be taken off the NCDOT's Bidders List.

Measurement and Payment

No compensation will be made for providing required training in accordance with these contract documents.

STANDARD SPECIAL PROVISION
MINIMUM WAGES
GENERAL DECISION NC140088 01/03/2014 NC88

Z-88

Date: January 3, 2014

General Decision Number: NC140088 01/03/2014 NC88

Superseded General Decision Numbers: NC20130088

State: North Carolina

Construction Type: HIGHWAY

COUNTIES:

Buncombe
Haywood
Henderson
Madison

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects, railroad construction, bascule, suspension and spandrel arch bridges designed for commercial navigation, bridges involving marine construction, and other major bridges).

Modification Number	Publication Date
0	01/03/2014

SUNC2011-069 09/16/2011

	Rates	Fringes
CARPENTER (Form Work Only)		
Buncombe County	13.18	
Haywood, Henderson, and Madison Counties	13.38	
CEMENT MASON/CONCRETE FINISHER	13.84	
IRONWORKER (Reinforcing)	14.88	
LABORER		
Asphalt, Asphalt Distributor, Raker, and Spreader		
Buncombe County	12.18	
Haywood, Henderson, and Madison Counties	12.33	
Common or General		
Buncombe County	11.60	
Haywood County	11.53	
Henderson County	10.75	
Madison County	11.54	
Concrete Saw	14.55	
Landscape	10.35	
Luteman	13.00	
Mason Tender (Cement/Concrete)	11.25	
Pipelayer	12.80	
Traffic Control (Cone Setter)	13.15	
Traffic Control (Flagger)	10.24	

	Rates	Fringes
POWER EQUIPMENT OPERATORS		
Backhoe/Excavator/Trackhoe		
Buncombe County	13.82	
Haywood and Madison Counties	14.05	
Henderson County	13.92	
Broom/Sweeper	13.97	
Bulldozer	15.27	
Crane	17.97	
Curb Machine	14.43	
Distributor	14.99	
Drill	16.68	
Grader/Blade		
Buncombe, Haywood, and Madison County	15.95	
Henderson County	14.25	
Loader		
Buncombe County	13.81	
Haywood, Henderson, and Madison Counties	14.14	
Mechanic	17.90	
Milling Machine	15.72	
Oiler	13.79	
Paver	17.60	
Roller		
Buncombe County	14.97	
Haywood, Henderson, and Madison Counties	15.04	
Scraper	15.85	
Screed	14.93	
Tractor	14.47	
TRUCK DRIVER		
Distributor	16.75	
Dump		
Buncombe County	12.28	
Haywood, Henderson, and Madison Counties	12.12	
Flatbed Truck	15.02	
Lowboy Truck	15.21	
Off the Road Truck	15.00	
Single Axle Truck	12.13	
Tack Truck	16.52	
Water Truck	13.16	

Welders – Receive rate prescribed for craft performing operation to which welding is incidental.

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 (29 CFR 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 rates.

0000/9999: weighted union wage rates will be published annually each January.

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, D.C. 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, D.C. 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, D.C. 20210

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

END OF GENERAL DECISION

STANDARD SPECIAL PROVISION
MINIMUM WAGES
GENERAL DECISION NC140043 01/03/2014 NC43

General Decision Number: NC140043 01/03/2014 NC43

Superseded General Decision Number: NC20130043

State: North Carolina

Construction Type: Building

Counties: Buncombe and Haywood 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	01/03/2014

ELEC0238-001 06/01/2011

	Rates	Fringes
ELECTRICIAN	$ 21.85	5.30 + 13%

IRON0384-002 05/01/2013

	Rates	Fringes
IRONWORKER, STRUCTURAL	$ 23.42	10.86

PLUM0421-003 07/01/2013

	Rates	Fringes
PIPEFITTER	$ 24.85	9.65

SUNC2011-024 08/24/2011

	Rates	Fringes
BRICKLAYER	$ 19.51	3.86
CARPENTER, Excludes Drywall Hanging, and Form Work	$ 15.68	0.00
CEMENT MASON/CONCRETE FINISHER	$ 16.41	0.00
DRYWALL HANGER	$ 13.83	0.00
FORM WORKER	$ 13.41	0.00
HVAC MECHANIC (HVAC Duct Installation Only)	$ 17.41	1.64
LABORER: Common or General	$ 10.87	1.03
LABORER: Landscape & Irrigation	$ 9.13	0.28
LABORER: Pipelayer	$ 13.35	2.80
LABORER: Mason Tender-Brick/Cement/Concrete	$ 12.00	0.00
OPERATOR: Backhoe/Excavator/Trackhoe	$ 16.00	2.48

OPERATOR: Bulldozer	$ 16.00	1.87
OPERATOR: Crane	$ 19.77	4.48
OPERATOR: Forklift	$ 13.86	0.00
OPERATOR: Grader/Blade	$ 15.72	1.49
OPERATOR: Loader	$ 16.17	0.25
PAINTER: Brush, Roller and Spray	$ 14.13	2.88
PLUMBER	$ 19.86	5.61
ROOFER	$ 12.50	0.81
SHEET METAL WORKER, Excludes HVAC Duct Installation	$ 15.96	1.13
TRUCK DRIVER	$ 14.51	0.85

Welders – Receive rate prescribed for craft performing operation to which welding is incidental.

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

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U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, D.C. 20210

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

END OF GENERAL DECISION

County : Haywood

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
			ROADWAY ITEMS			
0001	0000100000-N	800	MOBILIZATION	Lump Sum	L.S.	
0002	0000400000-N	801	CONSTRUCTION SURVEYING	Lump Sum	L.S.	
0003	0015000000-N	205	SEALING ABANDONED WELLS	1 EA		
0004	0022000000-E	225	UNCLASSIFIED EXCAVATION	39,300 CY		
0005	0036000000-E	225	UNDERCUT EXCAVATION	300 CY		
0006	0050000000-E	226	SUPPLEMENTARY CLEARING & GRUBBING	1 ACR		
0007	0063000000-N	SP	GRADING	Lump Sum	L.S.	
0008	0134000000-E	240	DRAINAGE DITCH EXCAVATION	420 CY		
0009	0192000000-N	260	PROOF ROLLING	10 HR		
0010	0195000000-E	265	SELECT GRANULAR MATERIAL	100 CY		
0011	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZATION	3,100 SY		
0012	0248000000-N	SP	GENERIC GRADING ITEM HAZARDOUS SPILL BASIN/ BIORETENTION BASIN	Lump Sum	L.S.	
0013	0318000000-E	300	FOUNDATION CONDITIONING MATERIAL, MINOR STRUCTURES	280 TON		
0014	0320000000-E	300	FOUNDATION CONDITIONING GEOTEXTILE	860 SY		
0015	0366000000-E	310	15" RC PIPE CULVERTS, CLASS III	56 LF		
0016	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	168 LF		
0017	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	96 LF		
0018	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	1,956 LF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0019	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	180 LF		
0020	0576000000-E	310	**" CS PIPE CULVERTS, *****" THICK (60", 0.138")	40 LF		
0021	0582000000-E	310	15" CS PIPE CULVERTS, 0.064" THICK	76 LF		
0022	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (15", 0.064")	1 EA		
0023	0995000000-E	340	PIPE REMOVAL	40 LF		
0024	1099500000-E	505	SHALLOW UNDERCUT	2,000 CY		
0025	1099700000-E	505	CLASS IV SUBGRADE STABILIZA-TION	3,780 TON		
0026	1110000000-E	510	STABILIZER AGGREGATE	250 TON		
0027	1121000000-E	520	AGGREGATE BASE COURSE	165 TON		
0028	1220000000-E	545	INCIDENTAL STONE BASE	300 TON		
0029	1297000000-E	607	MILLING ASPHALT PAVEMENT, ***" DEPTH (1-1/2")	1,715 SY		
0030	1489000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0B	2,780 TON		
0031	1498000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B	1,980 TON		
0032	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	1,530 TON		
0033	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	310 TON		
0034	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	10 TON		
0035	1840000000-E	665	MILLED RUMBLE STRIPS (ASPHALT CONCRETE)	750 LF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0036	1847000000-E	710	*****" PORT CEM CONC PAVEMENT, THROUGH LANES (WITH DOWELS) (8-1/2")	232 SY		
0037	2022000000-E	815	SUBDRAIN EXCAVATION	100.8 CY		
0038	2033000000-E	815	SUBDRAIN FINE AGGREGATE	50.4 CY		
0039	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	300 LF		
0040	2070000000-N	815	SUBDRAIN PIPE OUTLET	1 EA		
0041	2077000000-E	815	6" OUTLET PIPE	6 LF		
0042	2220000000-E	838	REINFORCED ENDWALLS	5.9 CY		
0043	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	35 EA		
0044	2297000000-E	840	MASONRY DRAINAGE STRUCTURES	12.4 CY		
0045	2366000000-N	840	FRAME WITH TWO GRATES, STD 840.24	11 EA		
0046	2367000000-N	840	FRAME WITH TWO GRATES, STD 840.29	4 EA		
0047	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	3 EA		
0048	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	2 EA		
0049	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	13 EA		
0050	2462000000-E	SP	**" SLUICE GATE (18")	1 EA		
0051	2462000000-E	SP	**" SLUICE GATE (6")	1 EA		
0052	2473000000-N	SP	GENERIC DRAINAGE ITEM RETICULINE FRAME & GRATE	2 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0053	2535000000-E	846	**"X **" CONCRETE CURB (8" X 12")	100 LF		
0054	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	3,330 LF		
0055	2556000000-E	846	SHOULDER BERM GUTTER	210 LF		
0056	2591000000-E	848	4" CONCRETE SIDEWALK	4,525 SY		
0057	2605000000-N	848	CONCRETE CURB RAMP	17 EA		
0058	2619000000-E	850	4" CONCRETE PAVED DITCH	11 SY		
0059	2655000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (KEYED IN)	80 SY		
0060	3360000000-E	863	REMOVE EXISTING GUARDRAIL	350 LF		
0061	3420000000-E	SP	GENERIC GUARDRAIL ITEM WEATHERING STEEL BEAM GUARD-RAIL WITH PAINTED LAPS	150 LF		
0062	3420000000-E	SP	GENERIC GUARDRAIL ITEM WEATHERING STEEL BEAM GUARD-RAIL WITH PAINTED LAPS, SHOP CURVED	81.25 LF		
0063	3435000000-N	SP	GENERIC GUARDRAIL ITEM PAINTED GUARDRAIL ANCHOR UNITS, TYPE 350	1 EA		
0064	3435000000-N	SP	GENERIC GUARDRAIL ITEM WEATHERING SB GUARDRAIL ANCHOR UNITS, TYPE AT-1 WITH PAINTED LAPS	1 EA		
0065	3435000000-N	SP	GENERIC GUARDRAIL ITEM WEATHERING STEEL ADDITIONAL GUARDRAIL POSTS	5 EA		
0066	3536000000-E	866	CHAIN LINK FENCE, 48" FABRIC	1,405 LF		
0067	3542000000-E	866	METAL LINE POSTS FOR 48" CHAIN LINK FENCE	118 EA		
0068	3548000000-E	866	METAL TERMINAL POSTS FOR 48" CHAIN LINK FENCE	7 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0069	3628000000-E	876	RIP RAP, CLASS I	20 TON		
0070	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	860 SY		
0071	4054000000-E	902	PLAIN CONCRETE SIGN FOUNDA-TIONS	2 CY		
0072	4060000000-E	903	SUPPORTS, BREAKAWAY STEEL BEAM	1,000 LB		
0073	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	306 LF		
0074	4078000000-E	903	SUPPORTS, 2-LB STEEL U-CHANNEL	1 EA		
0075	4096000000-N	904	SIGN ERECTION, TYPE D	1 EA		
0076	4102000000-N	904	SIGN ERECTION, TYPE E	20 EA		
0077	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	4 EA		
0078	4114000000-N	904	SIGN ERECTION, MILEMARKERS	1 EA		
0079	4152000000-N	907	DISPOSAL OF SIGN SYSTEM, STEEL BEAM	3 EA		
0080	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	3 EA		
0081	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	122 SF		
0082	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	159 SF		
0083	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	20 SF		
0084	4415000000-N	1115	FLASHING ARROW BOARD	1 EA		
0085	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	1 EA		
0086	4430000000-N	1130	DRUMS	150 EA		
0087	4445000000-E	1145	BARRICADES (TYPE III)	48 LF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0088	4480000000-N	1165	TMA	2 EA		
0089	4516000000-N	1180	SKINNY DRUM	44 EA		
0090	4695000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)	181 LF		
0091	4710000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 120 MILS)	30 LF		
0092	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	16 EA		
0093	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	5,638 LF		
0094	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	100 LF		
0095	4847000000-E	1205	POLYUREA PAVEMENT MARKING LINES (4", **********) (HIGHLY REFLECTIVE ELEMENTS)	2,284 LF		
0096	4847110000-E	1205	POLYUREA PAVEMENT MARKING LINES (8", **********) (HIGHLY REFLECTIVE ELEMENTS)	334 LF		
0097	4905000000-N	1253	SNOWPLOWABLE PAVEMENT MARKERS	13 EA		
0098	5070000000-N	1405	STANDARD FOUNDATION ********* (R1)	19 EA		
0099	5155000000-E	1409	ELECTRICAL DUCT, TYPE BD, SIZE ***** (2")	50 LF		
0100	5155000000-E	1409	ELECTRICAL DUCT, TYPE BD, SIZE ***** (3")	60 LF		
0101	5155000000-E	1409	ELECTRICAL DUCT, TYPE BD, SIZE ***** (4")	30 LF		
0102	5170000000-E	1410	** #8 W/G FEEDER CIRCUIT (2)	140 LF		
0103	5205000000-E	1410	** #8 W/G FEEDER CIRCUIT IN ******" CONDUIT (2, 1 1/2)	5,450 LF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0104	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ********** (PC18)	7 EA		
0105	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ********** (PC30)	1 EA		
0106	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ********** (PC36)	1 EA		
0107	5270000000-N	SP	GENERIC LIGHTING ITEM DAVIT STYLE LGT STD, MH 35', SA 6'	19 EA		
0108	5270000000-N	SP	GENERIC LIGHTING ITEM LIGHT CONTROL EQUIPMENT, TYPE RA 120/240	1 EA		
0109	5270000000-N	SP	GENERIC LIGHTING ITEM POST TOP LIGHT STANDARD	15 EA		
0110	5270000000-N	SP	GENERIC LIGHTING ITEM PT LUMINAIRES, LED, TYPE V	15 EA		
0111	5270000000-N	SP	GENERIC LIGHTING ITEM RDW LUMINAIRES, LED, TYPE III	19 EA		
0112	5270000000-N	SP	GENERIC LIGHTING ITEM STD FOUNDATION, TYPE R1S	15 EA		
0113	5325300000-E	1510	3" WATER LINE	330 LF		
0114	5325600000-E	1510	6" WATER LINE	2,025 LF		
0115	5534000000-E	1515	**" VALVE (1-1/2")	1 EA		
0116	5534000000-E	1515	**" VALVE (3")	2 EA		
0117	5534000000-E	1515	**" VALVE (3/4")	4 EA		
0118	5540000000-E	1515	6" VALVE	1 EA		
0119	5571600000-E	1515	6" TAPPING VALVE	1 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0120	5589200000-E	1515	2" AIR RELEASE VALVE	6 EA		
0121	5643150000-E	1515	1-1/2" WATER METER	1 EA		
0122	5666000000-E	1515	FIRE HYDRANT	1 EA		
0123	5691100000-E	1520	4" SANITARY GRAVITY SEWER	375 LF		
0124	5691500000-E	1520	12" SANITARY GRAVITY SEWER	400 LF		
0125	5709000000-E	1520	**" FORCE MAIN SEWER (3")	17,482 LF		
0126	5768000000-N	1520	SANITARY SEWER CLEAN-OUT	6 EA		
0127	5775000000-E	1525	4' DIA UTILITY MANHOLE	3 EA		
0128	5835400000-E	1540	6" ENCASEMENT PIPE	370 LF		
0129	5835600000-E	1540	12" ENCASEMENT PIPE	90 LF		
0130	5835700000-E	1540	16" ENCASEMENT PIPE	280 LF		
0131	5871200000-E	1550	TRENCHLESS INSTALLATION OF 3" IN SOIL	425 LF		
0132	5871210000-E	1550	TRENCHLESS INSTALLATION OF 3" NOT IN SOIL	425 LF		
0133	5871700000-E	1550	TRENCHLESS INSTALLATION OF 12" IN SOIL	45 LF		
0134	5871710000-E	1550	TRENCHLESS INSTALLATION OF 12" NOT IN SOIL	45 LF		
0135	5871900000-E	1550	TRENCHLESS INSTALLATION OF 16" IN SOIL	140 LF		
0136	5871910000-E	1550	TRENCHLESS INSTALLATION OF 16" NOT IN SOIL	140 LF		
0137	5882000000-N	SP	GENERIC UTILITY ITEM 3" PLUG VALVE	4 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0138	5882000000-N	SP	GENERIC UTILITY ITEM FORCE MAIN FLUSHING CONNECTION	2 EA		
0139	5888000000-E	SP	GENERIC UTILITY ITEM 3/4" PVC WATER PIPE, SCH 80	455 LF		
0140	5912000000-N	SP	GENERIC UTILITY ITEM NORTHBOUND SEWER PUMP STATION	Lump Sum	L.S.	
0141	5912000000-N	SP	GENERIC UTILITY ITEM SOUTHBOUND SEWER PUMP STATION	Lump Sum	L.S.	
0142	6000000000-E	1605	TEMPORARY SILT FENCE	4,815 LF		
0143	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	540 TON		
0144	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	460 TON		
0145	6012000000-E	1610	SEDIMENT CONTROL STONE	635 TON		
0146	6015000000-E	1615	TEMPORARY MULCHING	76 ACR		
0147	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	1,850 LB		
0148	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEED- ING	8.25 TON		
0149	6024000000-E	1622	TEMPORARY SLOPE DRAINS	200 LF		
0150	6029000000-E	SP	SAFETY FENCE	1,000 LF		
0151	6030000000-E	1630	SILT EXCAVATION	1,500 CY		
0152	6036000000-E	1631	MATTING FOR EROSION CONTROL	13,000 SY		
0153	6037000000-E	SP	COIR FIBER MAT	100 SY		
0154	6042000000-E	1632	1/4" HARDWARE CLOTH	1,050 LF		
0155	6071010000-E	SP	WATTLE	70 LF		
0156	6071012000-E	SP	COIR FIBER WATTLE	140 LF		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0157	6071020000-E	SP	POLYACRYLAMIDE (PAM)	180 LB		
0158	6071030000-E	1640	COIR FIBER BAFFLE	250 LF		
0159	6071050000-E	SP	**" SKIMMER (1-1/2")	2 EA		
0160	6084000000-E	1660	SEEDING & MULCHING	56 ACR		
0161	6087000000-E	1660	MOWING	50 ACR		
0162	6090000000-E	1661	SEED FOR REPAIR SEEDING	900 LB		
0163	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	2.1 TON		
0164	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	1,250 LB		
0165	6102000000-E	1664	SODDING	2,480 SY		
0166	6108000000-E	1665	FERTILIZER TOPDRESSING	36 TON		
0167	6114500000-N	1667	SPECIALIZED HAND MOWING	10 MHR		
0168	6117000000-N	SP	RESPONSE FOR EROSION CONTROL	100 EA		
0169	6123000000-E	1670	REFORESTATION	0.5 ACR		
0170	6135000000-E	SP	GENERIC EROSION CONTROL ITEM SEEDING & MULCHING BLUEGRASS FESCUE MIX REST AREA LAWN	3 ACR		
0171	6645000000-N	SP	GENERIC PLANTING ITEM BOULDERS	30 EA		
0172	6645000000-N	SP	GENERIC PLANTING ITEM STEPPING STONE	5 EA		
0173	6650000000-E	1670	MULCH FOR PLANTING	145 CY		
0174	6655000000-E	1670	WATER FOR PLANTING	20 M/G		
0175	6665000000-E	1670	POSTEMERGENT HERBICIDAL TREAT-MENT FOR PLANT BEDS	1,300 SY		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0176	6670000000-E	1670	PREEMERGENT HERBICIDAL TREAT-MENT FOR PLANT BEDS	1,300 SY		
0177	6674000000-N	SP	GENERIC PLANTING ITEM (LS) BOULDER WATER FEATURE	Lump Sum	L.S.	
0178	6674000000-N	SP	GENERIC PLANTING ITEM (LS) LANDSCAPE PLANTING (NBL)	Lump Sum	L.S.	
0179	6674000000-N	SP	GENERIC PLANTING ITEM (LS) LANDSCAPE PLANTING (SBL)	Lump Sum	L.S.	
0180	6674000000-N	SP	GENERIC PLANTING ITEM (LS) SPECIAL SIDEWALK CULVERT	Lump Sum	L.S.	
0181	6676000000-E	SP	GENERIC PLANTING ITEM PAVERS	2,130 SF		
0182	6676000000-E	SP	GENERIC PLANTING ITEM SEGMENTED RETAINING WALL	350 SF		
0183	6677000000-E	SP	GENERIC PLANTING ITEM RIVER STONE	7 TON		
0184	6680000000-E	SP	GENERIC PLANTING ITEM 12 MONTH AGED HARDWOOD MULCH	190 CY		
0185	6690000000-E	SP	GENERIC PLANTING ITEM TREE PROTECTION FENCE	300 LF		
0186	6690000000-E	SP	GENERIC PLANTING ITEM WORMSTYLE FENCING	1,350 LF		
0187	6890000000-E	SP	CONCRETE STEPS	6 CY		
0188	6895000000-E	SP	HANDRAIL ON STEPS	28 LF		
0189	6900000000-E	SP	TOPSOIL	100 CY		
0190	6905000000-N	SP	PICNIC TABLE, TERRAZZO & STEEL	3 EA		
0191	6915000000-N	SP	OUTDOOR PARK STOVE	2 EA		
0192	6945000000-E	SP	3/4" POST TYPE YARD HYDRANT	3 EA		
0193	6970000000-N	SP	GENERIC REST AREA ITEM FLAGPOLE	3 EA		

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0194	6970000000-N	SP	GENERIC REST AREA ITEM FLAGPOLE & SIGN LIGHTING	4 EA		
0195	6970000000-N	SP	GENERIC REST AREA ITEM PICNIC SHELTER, SINGLE PICNIC TABLE STONE VENEER BASE	5 EA		
0196	6970000000-N	SP	GENERIC REST AREA ITEM RECYCLING CONTAINER	10 EA		
0197	6970000000-N	SP	GENERIC REST AREA ITEM SITTING BENCH	7 EA		
0198	6970000000-N	SP	GENERIC REST AREA ITEM WASTE CONTAINER	10 EA		
0199	6970000000-N	SP	GENERIC REST AREA ITEM WHEEL STOPS @ H/C PARKING	4 EA		
0200	6975000000-N	SP	GENERIC REST AREA ITEM (NBL) REST AREA - SOLAR WATER HEATING SYSTEM	Lump Sum	L.S.	
0201	6975000000-N	SP	GENERIC REST AREA ITEM (SBL) REST AREA - SOLAR WATER HEATING SYSTEM	Lump Sum	L.S.	
0202	6975000000-N	SP	GENERIC REST AREA ITEM ELECTRICAL INSTALLATION FOR (NBL) REST AREA BUILDING	Lump Sum	L.S.	
0203	6975000000-N	SP	GENERIC REST AREA ITEM ELECTRICAL INSTALLATION FOR (SBL) REST AREA BUILDING	Lump Sum	L.S.	
0204	6975000000-N	SP	GENERIC REST AREA ITEM ELECTRICAL INSTALLATION FOR (SBL) STORAGE BUILDING	Lump Sum	L.S.	
0205	6975000000-N	SP	GENERIC REST AREA ITEM GENERAL CONSTRUCTION OF (SBL) REST AREA BUILDING	Lump Sum	L.S.	
0206	6975000000-N	SP	GENERIC REST AREA ITEM GENERAL CONSTRUCTION OF (SBL) STORAGE BUILDING	Lump Sum	L.S.	
0207	6975000000-N	SP	GENERIC REST AREA ITEM GENERAL RENOVATION OF (NBL) REST AREA BUILDING	Lump Sum	L.S.	

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0208	6975000000-N	SP	GENERIC REST AREA ITEM LANDSCAPE GRADING (NBL)	Lump Sum	L.S.	
0209	6975000000-N	SP	GENERIC REST AREA ITEM LANDSCAPE GRADING (SBL)	Lump Sum	L.S.	
0210	6975000000-N	SP	GENERIC REST AREA ITEM MECHANICAL INSTALLATION FOR (NBL) REST AREA BUILDING	Lump Sum	L.S.	
0211	6975000000-N	SP	GENERIC REST AREA ITEM MECHANICAL INSTALLATION FOR (SBL) REST AREA BUILDING	Lump Sum	L.S.	
0212	6975000000-N	SP	GENERIC REST AREA ITEM PLUMBING INSTALLATION OF (NBL) REST AREA BUILDING	Lump Sum	L.S.	
0213	6975000000-N	SP	GENERIC REST AREA ITEM PLUMBING INSTALLATION OF (SBL) REST AREA BUILDING	Lump Sum	L.S.	
0214	6975000000-N	SP	GENERIC REST AREA ITEM SITE DEMOLITION (NBL)	Lump Sum	L.S.	
0215	6975000000-N	SP	GENERIC REST AREA ITEM SPECIAL REST AREA SIGNAGE	Lump Sum	L.S.	
0216	6975000000-N	SP	GENERIC REST AREA ITEM STORMWATER DRAINAGE SYSTEM (NBL)	Lump Sum	L.S.	
0217	6975000000-N	SP	GENERIC REST AREA ITEM STORMWATER DRAINAGE SYSTEM (SBL)	Lump Sum	L.S.	
0218	6980000000-E	SP	GENERIC REST AREA ITEM LANDSCAPE METAL EDGING	1,790 LF		
0219	6980000000-E	SP	GENERIC REST AREA ITEM STONE SEATWALL	470 LF		
0220	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	15 LF		

Vendor 1 of 3: BUCHANAN AND SONS INC (5018)
Call Order 023 (Proposal: C203202)

Bid Information

County: HAYWOOD
Address: P.O. Box 123
Whittier , NC , 28789
Signature Check: Christopher_Buchanan_5018
Time Bid Received: March 18, 2014 01:59 PM
Amendment Count: 1

Bid Checksum: 23687B26
Bid Total: $6,151,716.03
Items Total: $6,151,716.03
Time Total: $0.00

Bidding Errors:
None.

DBE Goal Set 10.0
DBE Goal Met 10.0

Vendor 1 of 3: BUCHANAN AND SONS INC (5018)
Call Order 023 (Proposal: C203202)

Bid Bond Information

Projects:		**Bond Maximum:**	
Counties:		**State of Incorporation:**	
Bond ID:	SNC14746432	**Agency Execution Date:**	3/18/2014 12
Paid by Check:	No	**Surety Name:**	surety2000
Bond Percent:	5%	**Bond Agency Name:**	Hudson Insurance Company

Vendor 5018's Bid Information for Call 023, Letting L140318, 03/18/14

Buchanan and Sons Inc (5018)
Call Order 023 (Proposal ID C203202)

LIST OF DBE PARTICIPANTS

VENDOR NUMBER	DBE NAME / ADDRESS	WORK CODE TYPE OF WORK	CERT TYPE	AMOUNT	
4729 WB	THERESA'S CONCRETE SERVICE, INC PO BOX 1513 , SALISBURY, NC 28145		Sub	209,432.00	Committed
5534 WB	HIGH COUNTRY HYDROSEEDING INC 276 SWEETWATER DRIVE , CANTON, NC 28716		Sub	285,215.00	Committed
3765 WB	STAY ALERT SAFETY SERVICES INC POST OFFICE BOX 467 , KERNERSVILLE, NC 27285		Sub	59,820.00	Committed
4761 WB	TRAFFIC CONTROL SAFETY SERVICES POST OFFICE BOX 24511 , WINSTON-SALEM, NC 27114		Sub	13,256.70	Committed
8654 MB	BENNIE A GASKIN HAULING INC P.O. BOX 2653 , CANDLER, NC 28715		Sub	78,600.00	Committed
			TOTAL:	$646,323.70 10.51%	

Vendor 5018's Bid Information for Call 023, Letting L140318, 03/18/14

Buchanan and Sons Inc (5018)
Call Order 023 (Proposal ID C203202)

Miscelleneous Data Info - Contractor Responses:
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NON-COLLUSION AND DEBARMENT CERTIFICATION

Explanation of the prospective bidder that is unable to certify to any of the statements in this certification:

Explanation:
NOT ANSWERED
NOT ANSWERED
NOT ANSWERED
NOT ANSWERED

AWARD LIMITS ON MULTIPLE PROJECTS

By answering YES to this statement, the bidder acknowleges that they are using the award limits on multiple projects. Yes

It is the desire of the Bidder to be awarded contracts, the value of which will not exceed a total of 7,000,000.00 for those projects indicated herein, for which bids will be opened on 03/18/14 (MM/DD/YY)

The Award Limits shall apply to the following projects:

Contract Number	County
C203202	Haywood
C203454	Cherokee
NOT ANSWERED	
NOT ANSWERED	
NOT ANSWERED	
NOT ANSWERED	

```
Bid Bond Data Info - Contractor Responses:
==============================================

                BondID: SNC14746432
Surety Registry Agency: surety2000
             Verified?: Yes
         Surety Agency: Hudson Insurance Company
   Bond Execution Date: 3/18/2014 12
           Bond Amount:     $307,585.80 (Five Percent of Bid)
```

State of NC
Dept of Transportation

Date: 02-17-14
Revised: 03-14-14

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
Section 0001	ROADWAY ITEMS					
	Alt Group					
0001	0000100000-N MOBILIZATION	LUMP	LUMP		295,000.00	
0002	0000400000-N CONSTRUCTION SURVEYING	LUMP	LUMP		12,700.00	
0003	0015000000-N SEALING ABANDONED WELLS	1.000 EA	1,000.00000		1,000.00	
0004	0022000000-E UNCLASSIFIED EXCAVATION	39,300.000 CY	8.00000		314,400.00	
0005	0036000000-E UNDERCUT EXCAVATION	300.000 CY	12.00000		3,600.00	
0006	0050000000-E SUPPLEMENTARY CLEARING & GRUB-BING	1.000 ACR	2,500.00000		2,500.00	
0007	0063000000-N GRADING	LUMP	LUMP		100.00	
0008	0134000000-E DRAINAGE DITCH EXCAVATION	420.000 CY	10.00000		4,200.00	
0009	0192000000-N PROOF ROLLING	10.000 HR	135.00000		1,350.00	
0010	0195000000-E SELECT GRANULAR MATERIAL	100.000 CY	35.00000		3,500.00	
0011	0196000000-E GEOTEXTILE FOR SOIL STABILIZA-TION	3,100.000 SY	1.60000		4,960.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0012	0248000000-N GENERIC GRADING ITEM HAZARDOUS SPILL BASIN/ BIORETENTION BASIN	LUMP	LUMP		4,500.00	
0013	0318000000-E FOUNDATION CONDITIONING MATE- RIAL, MINOR STRUCTURES	280.000 TON	28.00000		7,840.00	
0014	0320000000-E FOUNDATION CONDITIONING GEO- TEXTILE	860.000 SY	2.00000		1,720.00	
0015	0366000000-E 15" RC PIPE CULVERTS, CLASS III	56.000 LF	40.00000		2,240.00	
0016	0372000000-E 18" RC PIPE CULVERTS, CLASS III	168.000 LF	48.00000		8,064.00	
0017	0378000000-E 24" RC PIPE CULVERTS, CLASS III	96.000 LF	60.00000		5,760.00	
0018	0448200000-E 15" RC PIPE CULVERTS, CLASS IV	1,956.000 LF	36.00000		70,416.00	
0019	0448300000-E 18" RC PIPE CULVERTS, CLASS IV	180.000 LF	42.00000		7,560.00	
0020	0576000000-E **" CS PIPE CULVERTS, *****" THICK (60", 0.138")	40.000 LF	195.00000		7,800.00	
0021	0582000000-E 15" CS PIPE CULVERTS, 0.064" THICK	76.000 LF	40.00000		3,040.00	
0022	0636000000-E **" CS PIPE ELBOWS, *****" THICK (15", 0.064")	1.000 EA	500.00000		500.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0023	0995000000-E PIPE REMOVAL	40.000 LF	10.00000		400.00	
0024	1099500000-E SHALLOW UNDERCUT	2,000.000 CY	8.00000		16,000.00	
0025	1099700000-E CLASS IV SUBGRADE STABILIZA- TION	3,780.000 TON	28.00000		105,840.00	
0026	1110000000-E STABILIZER AGGREGATE	250.000 TON	35.00000		8,750.00	
0027	1121000000-E AGGREGATE BASE COURSE	165.000 TON	35.00000		5,775.00	
0028	1220000000-E INCIDENTAL STONE BASE	300.000 TON	35.00000		10,500.00	
0029	1297000000-E MILLING ASPHALT PAVEMENT, ***"DEPTH (1-1/2")	1,715.000 SY	4.30000		7,374.50	
0030	1489000000-E ASPHALT CONC BASE COURSE, TYPE B25.0B	2,780.000 TON	67.00000		186,260.00	
0031	1498000000-E ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B	1,980.000 TON	63.00000		124,740.00	
0032	1519000000-E ASPHALT CONC SURFACE COURSE, TYPE S9.5B	1,530.000 TON	72.00000		110,160.00	
0033	1575000000-E ASPHALT BINDER FOR PLANT MIX	310.000 TON	750.00000		232,500.00	
0034	1693000000-E ASPHALT PLANT MIX, PAVEMENT REPAIR	10.000 TON	378.00000		3,780.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0035	1840000000-E MILLED RUMBLE STRIPS (ASPHALT CONCRETE)	750.000 LF	14.00000		10,500.00	
0036	1847000000-E ***** PORT CEM CONC PAVEMENT,THROUGH LANES (WITH DOWELS) (8-1/2")	232.000 SY	68.00000		15,776.00	
0037	2022000000-E SUBDRAIN EXCAVATION	100.800 CY	20.00000		2,016.00	
0038	2033000000-E SUBDRAIN FINE AGGREGATE	50.400 CY	80.00000		4,032.00	
0039	2044000000-E 6" PERFORATED SUBDRAIN PIPE	300.000 LF	13.00000		3,900.00	
0040	2070000000-N SUBDRAIN PIPE OUTLET	1.000 EA	300.00000		300.00	
0041	2077000000-E 6" OUTLET PIPE	6.000 LF	32.00000		192.00	
0042	2220000000-E REINFORCED ENDWALLS	5.900 CY	1,000.00000		5,900.00	
0043	2286000000-N MASONRY DRAINAGE STRUCTURES	35.000 EA	1,300.00000		45,500.00	
0044	2297000000-E MASONRY DRAINAGE STRUCTURES	12.400 CY	1,000.00000		12,400.00	
0045	2366000000-N FRAME WITH TWO GRATES, STD 840.24	11.000 EA	400.00000		4,400.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0046	2367000000-N FRAME WITH TWO GRATES, STD 840.29	4.000 EA	400.00000		1,600.00	
0047	2374000000-N FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	3.000 EA	450.00000		1,350.00	
0048	2374000000-N FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	2.000 EA	450.00000		900.00	
0049	2374000000-N FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	13.000 EA	450.00000		5,850.00	
0050	2462000000-E **" SLUICE GATE (18")	1.000 EA	4,000.00000		4,000.00	
0051	2462000000-E **" SLUICE GATE (6")	1.000 EA	2,300.00000		2,300.00	
0052	2473000000-N GENERIC DRAINAGE ITEM RETICULINE FRAME & GRATE	2.000 EA	7,000.00000		14,000.00	
0053	2535000000-E **"X **" CONCRETE CURB (8" X 12")	100.000 LF	15.25000		1,525.00	
0054	2549000000-E 2'-6" CONCRETE CURB & GUTTER	3,330.000 LF	17.25000		57,442.50	
0055	2556000000-E SHOULDER BERM GUTTER	210.000 LF	22.50000		4,725.00	
0056	2591000000-E 4" CONCRETE SIDEWALK	4,525.000 SY	30.00000		135,750.00	
0057	2605000000-N CONCRETE CURB RAMP	17.000 EA	1,200.00000		20,400.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0058	2619000000-E 4" CONCRETE PAVED DITCH	11.000 SY	45.00000		495.00	
0059	2655000000-E 5" MONOLITHIC CONCRETE ISLANDS(KEYED IN)	80.000 SY	60.00000		4,800.00	
0060	3360000000-E REMOVE EXISTING GUARDRAIL	350.000 LF	1.10000		385.00	
0061	3420000000-E GENERIC GUARDRAIL ITEM WEATHERING STEEL BEAM GUARD- RAIL WITH PAINTED LAPS	150.000 LF	21.50000		3,225.00	
0062	3420000000-E GENERIC GUARDRAIL ITEM WEATHERING STEEL BEAM GUARD- RAIL WITH PAINTED LAPS, SHOP CURVED	81.250 LF	21.50000		1,746.88	
0063	3435000000-N GENERIC GUARDRAIL ITEM PAINTED GUARDRAIL ANCHOR UNITS, TYPE 350	1.000 EA	1,160.00000		1,160.00	
0064	3435000000-N GENERIC GUARDRAIL ITEM WEATHERING SB GUARDRAIL ANCHOR UNITS, TYPE AT-1 WITH PAINTED LAPS	1.000 EA	1,160.00000		1,160.00	
0065	3435000000-N GENERIC GUARDRAIL ITEM WEATHERING STEEL ADDITIONAL GUARDRAIL POSTS	5.000 EA	22.00000		110.00	
0066	3536000000-E CHAIN LINK FENCE, 48" FABRIC	1,405.000 LF	5.40000		7,587.00	
0067	3542000000-E METAL LINE POSTS FOR 48" CHAINLINK FENCE	118.000 EA	41.00000		4,838.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0068	3548000000-E METAL TERMINAL POSTS FOR 48" CHAIN LINK FENCE	7.000 EA	135.00000		945.00	
0069	3628000000-E RIP RAP, CLASS I	20.000 TON	40.00000		800.00	
0070	3656000000-E GEOTEXTILE FOR DRAINAGE	860.000 SY	2.00000		1,720.00	
0071	4054000000-E PLAIN CONCRETE SIGN FOUNDATIONS	2.000 CY	300.00000		600.00	
0072	4060000000-E SUPPORTS, BREAKAWAY STEEL BEAM	1,000.000 LB	8.60000		8,600.00	
0073	4072000000-E SUPPORTS, 3-LB STEEL U-CHANNEL	306.000 LF	4.80000		1,468.80	
0074	4078000000-E SUPPORTS, 2-LB STEEL U-CHANNEL	1.000 EA	80.00000		80.00	
0075	4096000000-N SIGN ERECTION, TYPE D	1.000 EA	54.00000		54.00	
0076	4102000000-N SIGN ERECTION, TYPE E	20.000 EA	54.00000		1,080.00	
0077	4110000000-N SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	4.000 EA	485.00000		1,940.00	
0078	4114000000-N SIGN ERECTION, MILEMARKERS	1.000 EA	70.00000		70.00	
0079	4152000000-N DISPOSAL OF SIGN SYSTEM, STEELBEAM	3.000 EA	325.00000		975.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0080	4155000000-N DISPOSAL OF SIGN SYSTEM, U- CHANNEL	3.000 EA	1.00000		3.00	
0081	4400000000-E WORK ZONE SIGNS (STATIONARY)	122.000 SF	7.45000		908.90	
0082	4405000000-E WORK ZONE SIGNS (PORTABLE)	159.000 SF	11.90000		1,892.10	
0083	4410000000-E WORK ZONE SIGNS (BARRICADE MOUNTED)	20.000 SF	8.15000		163.00	
0084	4415000000-N FLASHING ARROW BOARD	1.000 EA	2,600.00000		2,600.00	
0085	4420000000-N PORTABLE CHANGEABLE MESSAGE SIGN	1.000 EA	10,000.00000		10,000.00	
0086	4430000000-N DRUMS	150.000 EA	59.00000		8,850.00	
0087	4445000000-E BARRICADES (TYPE III)	48.000 LF	16.00000		768.00	
0088	4480000000-N TMA	2.000 EA	24,500.00000		49,000.00	
0089	4516000000-N SKINNY DRUM	44.000 EA	37.65000		1,656.60	
0090	4695000000-E THERMOPLAST IC PAVEMENT MARKINGLINES (8", 90 MILS)	181.000 LF	6.60000		1,194.60	
0091	4710000000-E THERMOPLAST IC PAVEMENT MARKINGLINES (24", 120 MILS)	30.000 LF	22.00000		660.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0092	4725000000-E THERMOPLASTIC PAVEMENT MARKINGSYMBOL (90 MILS)	16.000 EA	165.50000		2,648.00	
0093	4810000000-E PAINT PAVEMENT MARKING LINES (4")	5,638.000 LF	0.50000		2,819.00	
0094	4835000000-E PAINT PAVEMENT MARKING LINES (24")	100.000 LF	4.50000		450.00	
0095	4847000000-E POLYUREA PAVEMENT MARKING LINES (4", **********) (HIGHLY REFLECTIVE ELEMENTS)	2,284.000 LF	2.20000		5,024.80	
0096	4847110000-E POLYUREA PAVEMENT MARKING LINES (8", **********) (HIGHLY REFLECTIVE ELEMENTS)	334.000 LF	4.50000		1,503.00	
0097	4905000000-N SNOWPLOWABLE PAVEMENT MARKERS	13.000 EA	192.50000		2,502.50	
0098	5070000000-N STANDARD FOUNDATION ********* (R1)	19.000 EA	1,105.00000		20,995.00	
0099	5155000000-E ELECTRICAL DUCT, TYPE BD, SIZE ***** (2")	50.000 LF	6.60000		330.00	
0100	5155000000-E ELECTRICAL DUCT, TYPE BD, SIZE ***** (3")	60.000 LF	7.75000		465.00	
0101	5155000000-E ELECTRICAL DUCT, TYPE BD, SIZE ***** (4")	30.000 LF	8.85000		265.50	
0102	5170000000-E ** #8 W/G FEEDER CIRCUIT (2)	140.000 LF	5.50000		770.00	

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0103	5205000000-E ** #8 W/G FEEDER CIRCUIT IN *****" CONDUIT (2, 1 1/2)	5,450.000 LF	10.75000		58,587.50	
0104	5240000000-N ELECTRICAL JUNCTION BOXES ********** (PC18)	7.000 EA	330.00000		2,310.00	
0105	5240000000-N ELECTRICAL JUNCTION BOXES ********** (PC30)	1.000 EA	660.00000		660.00	
0106	5240000000-N ELECTRICAL JUNCTION BOXES ********** (PC36)	1.000 EA	992.00000		992.00	
0107	5270000000-N GENERIC LIGHTING ITEM DAVIT STYLE LGT STD, MH 35', SA 6'	19.000 EA	2,270.00000		43,130.00	
0108	5270000000-N GENERIC LIGHTING ITEM LIGHT CONTROL EQUIPMENT, TYPE RA 120/240	1.000 EA	6,850.00000		6,850.00	
0109	5270000000-N GENERIC LIGHTING ITEM POST TOP LIGHT STANDARD	15.000 EA	2,150.00000		32,250.00	
0110	5270000000-N GENERIC LIGHTING ITEM PT LUMINAIRES, LED, TYPE V	15.000 EA	2,040.00000		30,600.00	
0111	5270000000-N GENERIC LIGHTING ITEM RDW LUMINAIRES, LED, TYPE III	19.000 EA	1,125.00000		21,375.00	
0112	5270000000-N GENERIC LIGHTING ITEM STD FOUNDATION, TYPE R1S	15.000 EA	820.00000		12,300.00	
0113	5325300000-E 3" WATER LINE	330.000 LF	24.00000		7,920.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0114	5325600000-E 6" WATER LINE	2,025.000 LF	32.00000		64,800.00	
0115	5534000000-E **" VALVE (1-1/2")	1.000 EA	700.00000		700.00	
0116	5534000000-E **" VALVE (3")	2.000 EA	850.00000		1,700.00	
0117	5534000000-E **" VALVE (3/4")	4.000 EA	740.00000		2,960.00	
0118	5540000000-E 6" VALVE	1.000 EA	1,655.00000		1,655.00	
0119	5571600000-E 6" TAPPING VALVE	1.000 EA	2,275.00000		2,275.00	
0120	5589200000-E 2" AIR RELEASE VALVE	6.000 EA	4,800.00000		28,800.00	
0121	5643150000-E 1-1/2" WATER METER	1.000 EA	3,800.00000		3,800.00	
0122	5666000000-E FIRE HYDRANT	1.000 EA	4,450.00000		4,450.00	
0123	5691100000-E 4" SANITARY GRAVITY SEWER	375.000 LF	18.00000		6,750.00	
0124	5691500000-E 12" SANITARY GRAVITY SEWER	400.000 LF	54.00000		21,600.00	
0125	5709000000-E **" FORCE MAIN SEWER (3")	17,482.000 LF	26.00000		454,532.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0126	5768000000-N SANITARY SEWER CLEAN-OUT	6.000 EA	500.00000		3,000.00	
0127	5775000000-E 4' DIA UTILITY MANHOLE	3.000 EA	3,250.00000		9,750.00	
0128	5835400000-E 6" ENCASEMENT PIPE	370.000 LF	60.50000		22,385.00	
0129	5835600000-E 12" ENCASEMENT PIPE	90.000 LF	72.60000		6,534.00	
0130	5835700000-E 16" ENCASEMENT PIPE	280.000 LF	84.00000		23,520.00	
0131	5871200000-E TRENCHLESS INSTALLATION OF 3" IN SOIL	425.000 LF	72.50000		30,812.50	
0132	5871210000-E TRENCHLESS INSTALLATION OF 3" NOT IN SOIL	425.000 LF	172.00000		73,100.00	
0133	5871700000-E TRENCHLESS INSTALLATION OF 12"IN SOIL	45.000 LF	156.00000		7,020.00	
0134	5871710000-E TRENCHLESS INSTALLATION OF 12"NOT IN SOIL	45.000 LF	808.00000		36,360.00	
0135	5871900000-E TRENCHLESS INSTALLATION OF 16"IN SOIL	140.000 LF	156.00000		21,840.00	
0136	5871910000-E TRENCHLESS INSTALLATION OF 16"NOT IN SOIL	140.000 LF	808.00000		113,120.00	
0137	5882000000-N GENERIC UTILITY ITEM 3" PLUG VALVE	4.000 EA	1,700.00000		6,800.00	

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Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0138	5882000000-N GENERIC UTILITY ITEM FORCE MAIN FLUSHING CONNECTION	2.000 EA	10,400.00000		20,800.00	
0139	5888000000-E GENERIC UTILITY ITEM 3/4" PVC WATER PIPE, SCH 80	455.000 LF	8.20000		3,731.00	
0140	5912000000-N GENERIC UTILITY ITEM NORTHBOUND SEWER PUMP STATION	LUMP	LUMP		72,000.00	
0141	5912000000-N GENERIC UTILITY ITEM SOUTHBOUND SEWER PUMP STATION	LUMP	LUMP		124,000.00	
0142	6000000000-E TEMPORARY SILT FENCE	4,815.000 LF	2.15000		10,352.25	
0143	6006000000-E STONE FOR EROSION CONTROL, CLASS A	540.000 TON	40.00000		21,600.00	
0144	6009000000-E STONE FOR EROSION CONTROL, CLASS B	460.000 TON	42.00000		19,320.00	
0145	6012000000-E SEDIMENT CONTROL STONE	635.000 TON	40.50000		25,717.50	
0146	6015000000-E TEMPORARY MULCHING	76.000 ACR	860.00000		65,360.00	
0147	6018000000-E SEED FOR TEMPORARY SEEDING	1,850.000 LB	3.25000		6,012.50	
0148	6021000000-E FERTILIZER FOR TEMPORARY SEED-ING	8.250 TON	992.00000		8,184.00	
0149	6024000000-E TEMPORARY SLOPE DRAINS	200.000 LF	16.50000		3,300.00	

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Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0150	6029000000-E SAFETY FENCE	1,000.000 LF	1.60000		1,600.00	
0151	6030000000-E SILT EXCAVATION	1,500.000 CY	8.15000		12,225.00	
0152	6036000000-E MATTING FOR EROSION CONTROL	13,000.000 SY	1.30000		16,900.00	
0153	6037000000-E COIR FIBER MAT	100.000 SY	10.75000		1,075.00	
0154	6042000000-E 1/4" HARDWARE CLOTH	1,050.000 LF	5.40000		5,670.00	
0155	6071010000-E WATTLE	70.000 LF	10.76000		753.20	
0156	6071012000-E COIR FIBER WATTLE	140.000 LF	13.25000		1,855.00	
0157	6071020000-E POLYACRYLAMIDE (PAM)	180.000 LB	16.14000		2,905.20	
0158	6071030000-E COIR FIBER BAFFLE	250.000 LF	10.76000		2,690.00	
0159	6071050000-E **" SKIMMER (1-1/2")	2.000 EA	125.00000		250.00	
0160	6084000000-E SEEDING & MULCHING	56.000 ACR	1,830.00000		102,480.00	
0161	6087000000-E MOWING	50.000 ACR	80.00000		4,000.00	

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Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0162	6090000000-E SEED FOR REPAIR SEEDING	900.000 LB	5.40000		4,860.00	
0163	6093000000-E FERTILIZER FOR REPAIR SEEDING	2.100 TON	992.00000		2,083.20	
0164	6096000000-E SEED FOR SUPPLEMENTAL SEEDING	1,250.000 LB	10.75000		13,437.50	
0165	6102000000-E SODDING	2,480.000 SY	6.50000		16,120.00	
0166	6108000000-E FERTILIZER TOPDRESSING	36.000 TON	1,000.00000		36,000.00	
0167	6114500000-N SPECIALIZED HAND MOWING	10.000 MHR	45.00000		450.00	
0168	6117000000-N RESPONSE FOR EROSION CONTROL	100.000 EA	55.00000		5,500.00	
0169	6123000000-E REFORESTATION	0.500 ACR	2,000.00000		1,000.00	
0170	6135000000-E GENERIC EROSION CONTROL ITEM SEEDING & MULCHING BLUEGRASS FESCUE MIX REST AREA LAWN	3.000 ACR	1,325.00000		3,975.00	
0171	6645000000-N GENERIC PLANTING ITEM BOULDERS	30.000 EA	105.00000		3,150.00	
0172	6645000000-N GENERIC PLANTING ITEM STEPPING STONE	5.000 EA	40.00000		200.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0173	6650000000-E MULCH FOR PLANTING	145.000 CY	50.00000		7,250.00	
0174	6655000000-E WATER FOR PLANTING	20.000 M/G	360.00000		7,200.00	
0175	6665000000-E POSTEMERGENT HERBICIDAL TREAT-MENT FOR PLANT BEDS	1,300.000 SY	0.10000		130.00	
0176	6670000000-E PREEMERGENT HERBICIDAL TREAT- MENT FOR PLANT BEDS	1,300.000 SY	0.35000		455.00	
0177	6674000000-N GENERIC PLANTING ITEM (LS) BOULDER WATER FEATURE	LUMP	LUMP		51,000.00	
0178	6674000000-N GENERIC PLANTING ITEM (LS) LANDSCAPE PLANTING (NBL)	LUMP	LUMP		12,600.00	
0179	6674000000-N GENERIC PLANTING ITEM (LS) LANDSCAPE PLANTING (SBL)	LUMP	LUMP		64,600.00	
0180	6674000000-N GENERIC PLANTING ITEM (LS) SPECIAL SIDEWALK CULVERT	LUMP	LUMP		4,100.00	
0181	6676000000-E GENERIC PLANTING ITEM PAVERS	2,130.000 SF	12.00000		25,560.00	
0182	6676000000-E GENERIC PLANTING ITEM SEGMENTED RETAINING WALL	350.000 SF	75.00000		26,250.00	
0183	6677000000-E GENERIC PLANTING ITEM RIVER STONE	7.000 TON	200.00000		1,400.00	
0184	6680000000-E GENERIC PLANTING ITEM 12 MONTH AGED HARDWOOD MULCH	190.000 CY	50.00000		9,500.00	

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Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0185	6690000000-E GENERIC PLANTING ITEM TREE PROTECTION FENCE	300.000 LF	1.30000		390.00	
0186	6690000000-E GENERIC PLANTING ITEM WORMSTYLE FENCING	1,350.000 LF	26.00000		35,100.00	
0187	6890000000-E CONCRETE STEPS	6.000 CY	720.00000		4,320.00	
0188	6895000000-E HANDRAIL ON STEPS	28.000 LF	200.00000		5,600.00	
0189	6900000000-E TOPSOIL	100.000 CY	52.00000		5,200.00	
0190	6905000000-N PICNIC TABLE, TERRAZZO & STEEL	3.000 EA	4,000.00000		12,000.00	
0191	6915000000-N OUTDOOR PARK STOVE	2.000 EA	2,550.00000		5,100.00	
0192	6945000000-E 3/4" POST TYPE YARD HYDRANT	3.000 EA	525.00000		1,575.00	
0193	6970000000-N GENERIC REST AREA ITEM FLAGPOLE	3.000 EA	3,350.00000		10,050.00	
0194	6970000000-N GENERIC REST AREA ITEM FLAGPOLE & SIGN LIGHTING	4.000 EA	2,150.00000		8,600.00	
0195	6970000000-N GENERIC REST AREA ITEM PICNIC SHELTER, SINGLE PICNIC TABLE STONE VENEER BASE	5.000 EA	25,000.00000		125,000.00	

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Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0196	6970000000-N GENERIC REST AREA ITEM RECYCLING CONTAINER	10.000 EA	850.00000		8,500.00	
0197	6970000000-N GENERIC REST AREA ITEM SITTING BENCH	7.000 EA	1,750.00000		12,250.00	
0198	6970000000-N GENERIC REST AREA ITEM WASTE CONTAINER	10.000 EA	765.00000		7,650.00	
0199	6970000000-N GENERIC REST AREA ITEM WHEEL STOPS @ H/C PARKING	4.000 EA	85.00000		340.00	
0200	6975000000-N GENERIC REST AREA ITEM (NBL) REST AREA - SOLAR WATER HEATING SYSTEM	LUMP	LUMP		20,000.00	
0201	6975000000-N GENERIC REST AREA ITEM (SBL) REST AREA - SOLAR WATER HEATING SYSTEM	LUMP	LUMP		20,000.00	
0202	6975000000-N GENERIC REST AREA ITEM ELECTRICAL INSTALLATION FOR (NBL) REST AREA BUILDING	LUMP	LUMP		60,100.00	
0203	6975000000-N GENERIC REST AREA ITEM ELECTRICAL INSTALLATION FOR (SBL) REST AREA BUILDING	LUMP	LUMP		90,500.00	
0204	6975000000-N GENERIC REST AREA ITEM ELECTRICAL INSTALLATION FOR (SBL) STORAGE BUILDING	LUMP	LUMP		5,650.00	
0205	6975000000-N GENERIC REST AREA ITEM GENERAL CONSTRUCTION OF (SBL) REST AREA BUILDING	LUMP	LUMP		520,000.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0206	6975000000-N GENERIC REST AREA ITEM GENERAL CONSTRUCTION OF (SBL) STORAGE BUILDING	LUMP	LUMP		37,750.00	
0207	6975000000-N GENERIC REST AREA ITEM GENERAL RENOVATION OF (NBL) REST AREA BUILDING	LUMP	LUMP		410,000.00	
0208	6975000000-N GENERIC REST AREA ITEM LANDSCAPE GRADING (NBL)	LUMP	LUMP		1,700.00	
0209	6975000000-N GENERIC REST AREA ITEM LANDSCAPE GRADING (SBL)	LUMP	LUMP		12,650.00	
0210	6975000000-N GENERIC REST AREA ITEM MECHANICAL INSTALLATION FOR (NBL) REST AREA BUILDING	LUMP	LUMP		30,600.00	
0211	6975000000-N GENERIC REST AREA ITEM MECHANICAL INSTALLATION FOR (SBL) REST AREA BUILDING	LUMP	LUMP		48,500.00	
0212	6975000000-N GENERIC REST AREA ITEM PLUMBING INSTALLATION OF (NBL) REST AREA BUILDING	LUMP	LUMP		143,300.00	
0213	6975000000-N GENERIC REST AREA ITEM PLUMBING INSTALLATION OF (SBL) REST AREA BUILDING	LUMP	LUMP		192,900.00	
0214	6975000000-N GENERIC REST AREA ITEM SITE DEMOLITION (NBL)	LUMP	LUMP		15,000.00	
0215	6975000000-N GENERIC REST AREA ITEM SPECIAL REST AREA SIGNAGE	LUMP	LUMP		35,500.00	

Contract ID: C203202 Project(s): NHS-0023(18)
Letting Date: 03-18-14 Call Order: 023
Bidder: 5018 - Buchanan and Sons Inc

Line No.	Item Description	Approx. Quantity and Units	Unit Price Dollars	Unit Price Cts	Bid Amount Dollars	Bid Amount Ct
0216	6975000000-N GENERIC REST AREA ITEM STORMWATER DRAINAGE SYSTEM (NBL)	LUMP	LUMP		16,600.00	
0217	6975000000-N GENERIC REST AREA ITEM STORMWATER DRAINAGE SYSTEM (SBL)	LUMP	LUMP		24,500.00	
0218	6980000000-E GENERIC REST AREA ITEM LANDSCAPE METAL EDGING	1,790.000 LF	4.50000		8,055.00	
0219	6980000000-E GENERIC REST AREA ITEM STONE SEATWALL	470.000 LF	275.00000		129,250.00	
0220	2308000000-E MASONRY DRAINAGE STRUCTURES	15.000 LF	250.00000		3,750.00	
	Section 0001 Total				6,151,716.03	
	Bid Total				6,151,716.03	

NON-COLLUSION AND DEBARMENT CERTIFICATION

The bidder certifies 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 this bid, 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, submitting this electronic bid constitutes the bidder's certification of Status under penalty of perjury under the laws of the United States and in accordance with the Debarment Certification on file with the Department.

By submitting this bid, the 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.

Where the prospective bidder is unable to certify to any of the statements in this certification, the bidder shall submit an explanation in the blanks provided herein. The explanation will not necessarily result in denial of participation in a contract.

Explanation:
NOT ANSWERED
NOT ANSWERED
NOT ANSWERED
NOT ANSWERED

If the prequalified bidder's status changes, he shall immediately submit a new fully executed non-collusion affidavit and debarment certification with an explanation of the change to the Contract Office prior to submitting the bid.

Failure to furnish a certification or an explanation will be grounds for rejection of a bid

AWARD LIMITS ON MULTIPLE PROJECTS

By answering YES to this statement, the bidder acknowleges that they are using the award limits on multiple projects. Yes

A bidder who desires to bid on more than one project on which bids are to be opened on the same date, and who also desires to avoid receiving an award of more projects than he is equipped to handle, may bid on any number of projects but may limit the total amount of work awarded to him on selected projects by completing the AWARD LIMITS ON MULTIPLE PROJECTS.

The Award Limits on Multiple Projects must be filled in on each project bid for which the Bidder desires protection.

It is the desire of the Bidder to be awarded contracts, the value of which

will not exceed a total of 7,000,000.00 for those

projects indicated herein, for which bids will be opened on 03/18/14 (MM/DD/YY)

The Award Limits shall apply to the following projects:

Contract Number	County
C203202	Haywood
C203454	Cherokee
NOT ANSWERED	
NOT ANSWERED	
NOT ANSWERED	
NOT ANSWERED	

It is agreed that if I am (we are) the low Bidder(s) on indicated projects, the total value of which is more than the above stipulated award limits, the Board of Transportation will award me (us) projects from among those indicated that have a total value not to exceed the award limit and will result in the lowest total bids to the Department of Transportation.

PROPOSAL: C203202
LETTING: L140318 CALL: 023
VENDOR: 5018 Buchanan and Sons Inc

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
DBE SUBCONTRACTOR: 4729 THERESA'S CONCRETE SERVICE, INC.						
Will Use Quote: Yes						
0053	2535000000-E	**"X**" CONC	LF	100.000	14.00000	1400.00
0054	2549000000-E	2'-6" CONC C	LF	3330.000	16.00000	53280.00
0055	2556000000-E	SHOULDER BER	LF	210.000	21.00000	4410.00
0056	2591000000-E	4" CONCRETE	SY	4525.000	28.00000	126700.00
0057	2605000000-N	CONCRETE CUR	EA	17.000	1100.00000	18700.00
0058	2619000000-E	4" CONCRETE	SY	11.000	42.00000	462.00
0059	2655000000-E	5" MONO CONC	SY	80.000	56.00000	4480.00
		DBE COMMITMENT TOTAL FOR SUBCONTRACTOR:				209,432.00 Committed
		DBE COMMITMENT TOTAL FOR VENDOR (SubContractor)				209,432
DBE SUBCONTRACTOR: 5534 HIGH COUNTRY HYDROSEEDING INC						
Will Use Quote: Yes						
0142	6000000000-E	TEMPORARY SI	LF	4815.000	2.00000	9630.00
0146	6015000000-E	TEMPORARY MU	ACR	76.000	800.00000	60800.00
0147	6018000000-E	SEED FOR TEM	LB	1850.000	3.00000	5550.00
0148	6021000000-E	FERT FOR TEM	TON	8.250	900.00000	7425.00
0150	6029000000-E	SAFETY FENCE	LF	1000.000	1.50000	1500.00
0152	6036000000-E	MATTING FOR	SY	13000.000	1.20000	15600.00
0153	6037000000-E	COIR FIBER M	SY	100.000	10.00000	1000.00
0154	6042000000-E	1/4" HARDWAR	LF	1050.000	5.00000	5250.00
0155	6071010000-E	WATTLE	LF	70.000	10.00000	700.00
0156	6071012000-E	COIR FIBER W	LF	140.000	12.00000	1680.00
0157	6071020000-E	POLYACRYLAMI	LB	180.000	12.00000	2160.00
0158	6071030000-E	COIR FIBER B	LF	250.000	10.00000	2500.00
0160	6084000000-E	SEEDING AND	ACR	56.000	1700.00000	95200.00
0161	6087000000-E	MOWING	ACR	50.000	75.00000	3750.00
0162	6090000000-E	SEED FOR REP	LB	900.000	5.00000	4500.00
0163	6093000000-E	FERT FOR REP	TON	2.100	900.00000	1890.00
0164	6096000000-E	SEED FOR SUP	LB	1250.000	10.00000	12500.00
0165	6102000000-E	SODDING	SY	2480.000	6.00000	14880.00
0166	6108000000-E	FERTILIZER T	TON	36.000	900.00000	32400.00
0167	6114500000-N	SPECIALIZED	MHR	10.000	40.00000	400.00
0168	6117000000-N	RESPONSE FOR	EA	100.000	50.00000	5000.00
0169	6123000000-E	REFORESTATIO	ACR	0.500	1800.00000	900.00
		DBE COMMITMENT TOTAL FOR SUBCONTRACTOR:				285,215.00 Committed
		DBE COMMITMENT TOTAL FOR VENDOR (SubContractor)				285,215
DBE SUBCONTRACTOR: 3765 STAY ALERT SAFETY SERVICES INC						
Will Use Quote: Yes						
0081	4400000000-E	WORK ZONE SI	SF	122.000	6.90000	841.80

LINE NO.	ITEM NO.	ITEM DESC.	UNIT TYPE	SUBCONTRACTOR QUANTITY	SUBCONTRACTOR UNIT PRICE	EXTENDED AMOUNT
0083	4410000000-E	WORK ZONE SI	SF	20.000	7.55000	151.00
0084	4415000000-N	FLASHING ARR	EA	1.000	2385.00000	2385.00
0085	4420000000-N	PORTABLE CHA	EA	1.000	8895.00000	8895.00
0087	4445000000-E	BARRICADES (	LF	48.000	14.90000	715.20
0088	4480000000-N	TMA	EA	2.000	22800.00000	45600.00
0089	4516000000-N	SKINNY DROM	EA	44.000	28.00000	1232.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 59,820.00 Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 59,820.

DBE SUBCONTRACTOR: 4761 TRAFFIC CONTROL SAFETY SERVICES, INC.
Will Use Quote: Yes

0071	4054000000-E	PLN CONC FOU	CY	2.000	1.00000	2.00
0072	4060000000-E	SUPPORT, BRE	LB	1000.000	8.00000	8000.00
0073	4072000000-E	SUPPORT, 3-L	LF	306.000	4.45000	1361.70
0074	4078000000-E	SUPPORT, 2-L	EA	1.000	75.00000	75.00
0075	4096000000-N	SIGN ERECTIO	EA	1.000	50.00000	50.00
0076	4102000000-N	SIGN ERECTIO	EA	20.000	50.00000	1000.00
0077	4110000000-N	SIGN ERECTIO	EA	4.000	450.00000	1800.00
0078	4114000000-N	SIGN ERECTIO	EA	1.000	65.00000	65.00
0079	4152000000-N	DISPOSE SIGN	EA	3.000	300.00000	900.00
0080	4155000000-N	DISPOSE SIGN	EA	3.000	1.00000	3.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 13,256.70 Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 13,256.

DBE SUBCONTRACTOR: 8654 BENNIE A GASKIN HAULING INC
Will Use Quote: Yes

0004	0022000000-E	UNCLASSIFIED	CY	39300.000	2.00000	78600.00

DBE COMMITMENT TOTAL FOR SUBCONTRACTOR: 78,600.00 Committed
DBE COMMITMENT TOTAL FOR VENDOR (SubContractor) 78,600.

TOTAL DBE COMMITMENT FOR VENDOR: Entered: 10.51% or 646323.70
Required: 10.00% or 615171.60
<GOAL MET>

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
			ROADWAY ITEMS			
0001	0000100000-N	800	MOBILIZATION	Lump Sum LS	295,000.00	295,000.00
0002	0000400000-N	801	CONSTRUCTION SURVEYING	Lump Sum LS	12,700.00	12,700.00
0003	0015000000-N	205	SEALING ABANDONED WELLS	1 EA	1,000.00	1,000.00
0004	0022000000-E	225	UNCLASSIFIED EXCAVATION	39,300 CY	8.00	314,400.00
0005	0036000000-E	225	UNDERCUT EXCAVATION	300 CY	12.00	3,600.00
0006	0050000000-E	226	SUPPLEMENTARY CLEARING & GRUB-BING	1 ACR	2,500.00	2,500.00
0007	0063000000-N	SP	GRADING	Lump Sum LS	100.00	100.00
0008	0134000000-E	240	DRAINAGE DITCH EXCAVATION	420 CY	10.00	4,200.00
0009	0192000000-N	260	PROOF ROLLING	10 HR	135.00	1,350.00
0010	0195000000-E	265	SELECT GRANULAR MATERIAL	100 CY	35.00	3,500.00
0011	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZA-TION	3,100 SY	1.60	4,960.00
0012	0248000000-N	SP	GENERIC GRADING ITEM HAZARDOUS SPILL BASIN/ BIORETENTION BASIN	Lump Sum LS	4,500.00	4,500.00
0013	0318000000-E	300	FOUNDATION CONDITIONING MATE-RIAL, MINOR STRUCTURES	280 TON	28.00	7,840.00
0014	0320000000-E	300	FOUNDATION CONDITIONING GEO-TEXTILE	860 SY	2.00	1,720.00
0015	0366000000-E	310	15" RC PIPE CULVERTS, CLASS III	56 LF	40.00	2,240.00
0016	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	168 LF	48.00	8,064.00
0017	0378000000-E	310	24" RC PIPE CULVERTS, CLASS III	96 LF	60.00	5,760.00
0018	0448200000-E	310	15" RC PIPE CULVERTS, CLASS IV	1,956 LF	36.00	70,416.00
0019	0448300000-E	310	18" RC PIPE CULVERTS, CLASS IV	180 LF	42.00	7,560.00

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0020	0576000000-E	310	**" CS PIPE CULVERTS, *****" THICK (60", 0.138")	40 LF	195.00	7,800.00
0021	0582000000-E	310	15" CS PIPE CULVERTS, 0.064" THICK	76 LF	40.00	3,040.00
0022	0636000000-E	310	**" CS PIPE ELBOWS, *****" THICK (15", 0.064")	1 EA	500.00	500.00
0023	0995000000-E	340	PIPE REMOVAL	40 LF	10.00	400.00
0024	1099500000-E	505	SHALLOW UNDERCUT	2,000 CY	8.00	16,000.00
0025	1099700000-E	505	CLASS IV SUBGRADE STABILIZA-TION	3,780 TON	28.00	105,840.00
0026	1110000000-E	510	STABILIZER AGGREGATE	250 TON	35.00	8,750.00
0027	1121000000-E	520	AGGREGATE BASE COURSE	165 TON	35.00	5,775.00
0028	1220000000-E	545	INCIDENTAL STONE BASE	300 TON	35.00	10,500.00
0029	1297000000-E	607	MILLING ASPHALT PAVEMENT, ***" DEPTH (1-1/2")	1,715 SY	4.30	7,374.50
0030	1489000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0B	2,780 TON	67.00	186,260.00
0031	1498000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B	1,980 TON	63.00	124,740.00
0032	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	1,530 TON	72.00	110,160.00
0033	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	310 TON	750.00	232,500.00
0034	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	10 TON	378.00	3,780.00
0035	1840000000-E	665	MILLED RUMBLE STRIPS (ASPHALT CONCRETE)	750 LF	14.00	10,500.00
0036	1847000000-E	710	*****" PORT CEM CONC PAVEMENT, THROUGH LANES (WITH DOWELS) (8-1/2")	232 SY	68.00	15,776.00

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0037	2022000000-E	815	SUBDRAIN EXCAVATION	100.8 CY	20.00	2,016.00
0038	2033000000-E	815	SUBDRAIN FINE AGGREGATE	50.4 CY	80.00	4,032.00
0039	2044000000-E	815	6" PERFORATED SUBDRAIN PIPE	300 LF	13.00	3,900.00
0040	2070000000-N	815	SUBDRAIN PIPE OUTLET	1 EA	300.00	300.00
0041	2077000000-E	815	6" OUTLET PIPE	6 LF	32.00	192.00
0042	2220000000-E	838	REINFORCED ENDWALLS	5.9 CY	1,000.00	5,900.00
0043	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	35 EA	1,300.00	45,500.00
0044	2297000000-E	840	MASONRY DRAINAGE STRUCTURES	12.4 CY	1,000.00	12,400.00
0045	2366000000-N	840	FRAME WITH TWO GRATES, STD 840.24	11 EA	400.00	4,400.00
0046	2367000000-N	840	FRAME WITH TWO GRATES, STD 840.29	4 EA	400.00	1,600.00
0047	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (E)	3 EA	450.00	1,350.00
0048	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (F)	2 EA	450.00	900.00
0049	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (G)	13 EA	450.00	5,850.00
0050	2462000000-E	SP	**" SLUICE GATE (18")	1 EA	4,000.00	4,000.00
0051	2462000000-E	SP	**" SLUICE GATE (6")	1 EA	2,300.00	2,300.00
0052	2473000000-N	SP	GENERIC DRAINAGE ITEM RETICULINE FRAME & GRATE	2 EA	7,000.00	14,000.00
0053	2535000000-E	846	**"X **" CONCRETE CURB (8" X 12")	100 LF	15.25	1,525.00
0054	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	3,330 LF	17.25	57,442.50

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0055	2556000000-E	846	SHOULDER BERM GUTTER	210 LF	22.50	4,725.00
0056	2591000000-E	848	4" CONCRETE SIDEWALK	4,525 SY	30.00	135,750.00
0057	2605000000-N	848	CONCRETE CURB RAMP	17 EA	1,200.00	20,400.00
0058	2619000000-E	850	4" CONCRETE PAVED DITCH	11 SY	45.00	495.00
0059	2655000000-E	852	5" MONOLITHIC CONCRETE ISLANDS (KEYED IN)	80 SY	60.00	4,800.00
0060	3360000000-E	863	REMOVE EXISTING GUARDRAIL	350 LF	1.10	385.00
0061	3420000000-E	SP	GENERIC GUARDRAIL ITEM WEATHERING STEEL BEAM GUARD-RAIL WITH PAINTED LAPS	150 LF	21.50	3,225.00
0062	3420000000-E	SP	GENERIC GUARDRAIL ITEM WEATHERING STEEL BEAM GUARD-RAIL WITH PAINTED LAPS, SHOP CURVED	81.25 LF	21.50	1,746.88
0063	3435000000-N	SP	GENERIC GUARDRAIL ITEM PAINTED GUARDRAIL ANCHOR UNITS, TYPE 350	1 EA	1,160.00	1,160.00
0064	3435000000-N	SP	GENERIC GUARDRAIL ITEM WEATHERING SB GUARDRAIL ANCHOR UNITS, TYPE AT-1 WITH PAINTED LAPS	1 EA	1,160.00	1,160.00
0065	3435000000-N	SP	GENERIC GUARDRAIL ITEM WEATHERING STEEL ADDITIONAL GUARDRAIL POSTS	5 EA	22.00	110.00
0066	3536000000-E	866	CHAIN LINK FENCE, 48" FABRIC	1,405 LF	5.40	7,587.00
0067	3542000000-E	866	METAL LINE POSTS FOR 48" CHAIN LINK FENCE	118 EA	41.00	4,838.00
0068	3548000000-E	866	METAL TERMINAL POSTS FOR 48" CHAIN LINK FENCE	7 EA	135.00	945.00
0069	3628000000-E	876	RIP RAP, CLASS I	20 TON	40.00	800.00
0070	3656000000-E	876	GEOTEXTILE FOR DRAINAGE	860 SY	2.00	1,720.00
0071	4054000000-E	902	PLAIN CONCRETE SIGN FOUNDA-TIONS	2 CY	300.00	600.00

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0072	4060000000-E	903	SUPPORTS, BREAKAWAY STEEL BEAM	1,000 LB	8.60	8,600.00
0073	4072000000-E	903	SUPPORTS, 3-LB STEEL U-CHANNEL	306 LF	4.80	1,468.80
0074	4078000000-E	903	SUPPORTS, 2-LB STEEL U-CHANNEL	1 EA	80.00	80.00
0075	4096000000-N	904	SIGN ERECTION, TYPE D	1 EA	54.00	54.00
0076	4102000000-N	904	SIGN ERECTION, TYPE E	20 EA	54.00	1,080.00
0077	4110000000-N	904	SIGN ERECTION, TYPE *** (GROUND MOUNTED) (A)	4 EA	485.00	1,940.00
0078	4114000000-N	904	SIGN ERECTION, MILEMARKERS	1 EA	70.00	70.00
0079	4152000000-N	907	DISPOSAL OF SIGN SYSTEM, STEEL BEAM	3 EA	325.00	975.00
0080	4155000000-N	907	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	3 EA	1.00	3.00
0081	4400000000-E	1110	WORK ZONE SIGNS (STATIONARY)	122 SF	7.45	908.90
0082	4405000000-E	1110	WORK ZONE SIGNS (PORTABLE)	159 SF	11.90	1,892.10
0083	4410000000-E	1110	WORK ZONE SIGNS (BARRICADE MOUNTED)	20 SF	8.15	163.00
0084	4415000000-N	1115	FLASHING ARROW BOARD	1 EA	2,600.00	2,600.00
0085	4420000000-N	1120	PORTABLE CHANGEABLE MESSAGE SIGN	1 EA	10,000.00	10,000.00
0086	4430000000-N	1130	DRUMS	150 EA	59.00	8,850.00
0087	4445000000-E	1145	BARRICADES (TYPE III)	48 LF	16.00	768.00
0088	4480000000-N	1165	TMA	2 EA	24,500.00	49,000.00
0089	4516000000-N	1180	SKINNY DRUM	44 EA	37.65	1,656.60
0090	4695000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (8", 90 MILS)	181 LF	6.60	1,194.60

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0091	4710000000-E	1205	THERMOPLASTIC PAVEMENT MARKING LINES (24", 120 MILS)	30 LF	22.00	660.00
0092	4725000000-E	1205	THERMOPLASTIC PAVEMENT MARKING SYMBOL (90 MILS)	16 EA	165.50	2,648.00
0093	4810000000-E	1205	PAINT PAVEMENT MARKING LINES (4")	5,638 LF	0.50	2,819.00
0094	4835000000-E	1205	PAINT PAVEMENT MARKING LINES (24")	100 LF	4.50	450.00
0095	4847000000-E	1205	POLYUREA PAVEMENT MARKING LINES (4", **********) (HIGHLY REFLECTIVE ELEMENTS)	2,284 LF	2.20	5,024.80
0096	4847110000-E	1205	POLYUREA PAVEMENT MARKING LINES (8", **********) (HIGHLY REFLECTIVE ELEMENTS)	334 LF	4.50	1,503.00
0097	4905000000-N	1253	SNOWPLOWABLE PAVEMENT MARKERS	13 EA	192.50	2,502.50
0098	5070000000-N	1405	STANDARD FOUNDATION ********* (R1)	19 EA	1,105.00	20,995.00
0099	5155000000-E	1409	ELECTRICAL DUCT, TYPE BD, SIZE ***** (2")	50 LF	6.60	330.00
0100	5155000000-E	1409	ELECTRICAL DUCT, TYPE BD, SIZE ***** (3")	60 LF	7.75	465.00
0101	5155000000-E	1409	ELECTRICAL DUCT, TYPE BD, SIZE ***** (4")	30 LF	8.85	265.50
0102	5170000000-E	1410	** #8 W/G FEEDER CIRCUIT (2)	140 LF	5.50	770.00
0103	5205000000-E	1410	** #8 W/G FEEDER CIRCUIT IN ******" CONDUIT (2, 1 1/2)	5,450 LF	10.75	58,587.50
0104	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ********** (PC18)	7 EA	330.00	2,310.00
0105	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ********** (PC30)	1 EA	660.00	660.00

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0106	5240000000-N	1411	ELECTRICAL JUNCTION BOXES ********** (PC36)	1 EA	992.00	992.00
0107	5270000000-N	SP	GENERIC LIGHTING ITEM DAVIT STYLE LGT STD, MH 35', SA 6'	19 EA	2,270.00	43,130.00
0108	5270000000-N	SP	GENERIC LIGHTING ITEM LIGHT CONTROL EQUIPMENT, TYPE RA 120/240	1 EA	6,850.00	6,850.00
0109	5270000000-N	SP	GENERIC LIGHTING ITEM POST TOP LIGHT STANDARD	15 EA	2,150.00	32,250.00
0110	5270000000-N	SP	GENERIC LIGHTING ITEM PT LUMINAIRES, LED, TYPE V	15 EA	2,040.00	30,600.00
0111	5270000000-N	SP	GENERIC LIGHTING ITEM RDW LUMINAIRES, LED, TYPE III	19 EA	1,125.00	21,375.00
0112	5270000000-N	SP	GENERIC LIGHTING ITEM STD FOUNDATION, TYPE R1S	15 EA	820.00	12,300.00
0113	5325300000-E	1510	3" WATER LINE	330 LF	24.00	7,920.00
0114	5325600000-E	1510	6" WATER LINE	2,025 LF	32.00	64,800.00
0115	5534000000-E	1515	**" VALVE (1-1/2")	1 EA	700.00	700.00
0116	5534000000-E	1515	**" VALVE (3")	2 EA	850.00	1,700.00
0117	5534000000-E	1515	**" VALVE (3/4")	4 EA	740.00	2,960.00
0118	5540000000-E	1515	6" VALVE	1 EA	1,655.00	1,655.00
0119	5571600000-E	1515	6" TAPPING VALVE	1 EA	2,275.00	2,275.00
0120	5589200000-E	1515	2" AIR RELEASE VALVE	6 EA	4,800.00	28,800.00
0121	5643150000-E	1515	1-1/2" WATER METER	1 EA	3,800.00	3,800.00
0122	5666000000-E	1515	FIRE HYDRANT	1 EA	4,450.00	4,450.00
0123	5691100000-E	1520	4" SANITARY GRAVITY SEWER	375 LF	18.00	6,750.00

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0124	5691500000-E	1520	12" SANITARY GRAVITY SEWER	400 LF	54.00	21,600.00
0125	5709000000-E	1520	**" FORCE MAIN SEWER (3")	17,482 LF	26.00	454,532.00
0126	5768000000-N	1520	SANITARY SEWER CLEAN-OUT	6 EA	500.00	3,000.00
0127	5775000000-E	1525	4' DIA UTILITY MANHOLE	3 EA	3,250.00	9,750.00
0128	5835400000-E	1540	6" ENCASEMENT PIPE	370 LF	60.50	22,385.00
0129	5835600000-E	1540	12" ENCASEMENT PIPE	90 LF	72.60	6,534.00
0130	5835700000-E	1540	16" ENCASEMENT PIPE	280 LF	84.00	23,520.00
0131	5871200000-E	1550	TRENCHLESS INSTALLATION OF 3" IN SOIL	425 LF	72.50	30,812.50
0132	5871210000-E	1550	TRENCHLESS INSTALLATION OF 3" NOT IN SOIL	425 LF	172.00	73,100.00
0133	5871700000-E	1550	TRENCHLESS INSTALLATION OF 12" IN SOIL	45 LF	156.00	7,020.00
0134	5871710000-E	1550	TRENCHLESS INSTALLATION OF 12" NOT IN SOIL	45 LF	808.00	36,360.00
0135	5871900000-E	1550	TRENCHLESS INSTALLATION OF 16" IN SOIL	140 LF	156.00	21,840.00
0136	5871910000-E	1550	TRENCHLESS INSTALLATION OF 16" NOT IN SOIL	140 LF	808.00	113,120.00
0137	5882000000-N	SP	GENERIC UTILITY ITEM 3" PLUG VALVE	4 EA	1,700.00	6,800.00
0138	5882000000-N	SP	GENERIC UTILITY ITEM FORCE MAIN FLUSHING CONNECTION	2 EA	10,400.00	20,800.00
0139	5888000000-E	SP	GENERIC UTILITY ITEM 3/4" PVC WATER PIPE, SCH 80	455 LF	8.20	3,731.00
0140	5912000000-N	SP	GENERIC UTILITY ITEM NORTHBOUND SEWER PUMP STATION	Lump Sum LS	72,000.00	72,000.00
0141	5912000000-N	SP	GENERIC UTILITY ITEM SOUTHBOUND SEWER PUMP STATION	Lump Sum LS	124,000.00	124,000.00

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0142	6000000000-E	1605	TEMPORARY SILT FENCE	4,815 LF	2.15	10,352.25
0143	6006000000-E	1610	STONE FOR EROSION CONTROL, CLASS A	540 TON	40.00	21,600.00
0144	6009000000-E	1610	STONE FOR EROSION CONTROL, CLASS B	460 TON	42.00	19,320.00
0145	6012000000-E	1610	SEDIMENT CONTROL STONE	635 TON	40.50	25,717.50
0146	6015000000-E	1615	TEMPORARY MULCHING	76 ACR	860.00	65,360.00
0147	6018000000-E	1620	SEED FOR TEMPORARY SEEDING	1,850 LB	3.25	6,012.50
0148	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEED-ING	8.25 TON	992.00	8,184.00
0149	6024000000-E	1622	TEMPORARY SLOPE DRAINS	200 LF	16.50	3,300.00
0150	6029000000-E	SP	SAFETY FENCE	1,000 LF	1.60	1,600.00
0151	6030000000-E	1630	SILT EXCAVATION	1,500 CY	8.15	12,225.00
0152	6036000000-E	1631	MATTING FOR EROSION CONTROL	13,000 SY	1.30	16,900.00
0153	6037000000-E	SP	COIR FIBER MAT	100 SY	10.75	1,075.00
0154	6042000000-E	1632	1/4" HARDWARE CLOTH	1,050 LF	5.40	5,670.00
0155	6071010000-E	SP	WATTLE	70 LF	10.76	753.20
0156	6071012000-E	SP	COIR FIBER WATTLE	140 LF	13.25	1,855.00
0157	6071020000-E	SP	POLYACRYLAMIDE (PAM)	180 LB	16.14	2,905.20
0158	6071030000-E	1640	COIR FIBER BAFFLE	250 LF	10.76	2,690.00
0159	6071050000-E	SP	**" SKIMMER (1-1/2")	2 EA	125.00	250.00
0160	6084000000-E	1660	SEEDING & MULCHING	56 ACR	1,830.00	102,480.00
0161	6087000000-E	1660	MOWING	50 ACR	80.00	4,000.00

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0162	6090000000-E	1661	SEED FOR REPAIR SEEDING	900 LB	5.40	4,860.00
0163	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	2.1 TON	992.00	2,083.20
0164	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	1,250 LB	10.75	13,437.50
0165	6102000000-E	1664	SODDING	2,480 SY	6.50	16,120.00
0166	6108000000-E	1665	FERTILIZER TOPDRESSING	36 TON	1,000.00	36,000.00
0167	6114500000-N	1667	SPECIALIZED HAND MOWING	10 MHR	45.00	450.00
0168	6117000000-N	SP	RESPONSE FOR EROSION CONTROL	100 EA	55.00	5,500.00
0169	6123000000-E	1670	REFORESTATION	0.5 ACR	2,000.00	1,000.00
0170	6135000000-E	SP	GENERIC EROSION CONTROL ITEM SEEDING & MULCHING BLUEGRASS FESCUE MIX REST AREA LAWN	3 ACR	1,325.00	3,975.00
0171	6645000000-N	SP	GENERIC PLANTING ITEM BOULDERS	30 EA	105.00	3,150.00
0172	6645000000-N	SP	GENERIC PLANTING ITEM STEPPING STONE	5 EA	40.00	200.00
0173	6650000000-E	1670	MULCH FOR PLANTING	145 CY	50.00	7,250.00
0174	6655000000-E	1670	WATER FOR PLANTING	20 M/G	360.00	7,200.00
0175	6665000000-E	1670	POSTEMERGENT HERBICIDAL TREAT-MENT FOR PLANT BEDS	1,300 SY	0.10	130.00
0176	6670000000-E	1670	PREEMERGENT HERBICIDAL TREAT-MENT FOR PLANT BEDS	1,300 SY	0.35	455.00
0177	6674000000-N	SP	GENERIC PLANTING ITEM (LS) BOULDER WATER FEATURE	Lump Sum LS	51,000.00	51,000.00
0178	6674000000-N	SP	GENERIC PLANTING ITEM (LS) LANDSCAPE PLANTING (NBL)	Lump Sum LS	12,600.00	12,600.00
0179	6674000000-N	SP	GENERIC PLANTING ITEM (LS) LANDSCAPE PLANTING (SBL)	Lump Sum LS	64,600.00	64,600.00

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0180	6674000000-N	SP	GENERIC PLANTING ITEM (LS) SPECIAL SIDEWALK CULVERT	Lump Sum LS	4,100.00	4,100.00
0181	6676000000-E	SP	GENERIC PLANTING ITEM PAVERS	2,130 SF	12.00	25,560.00
0182	6676000000-E	SP	GENERIC PLANTING ITEM SEGMENTED RETAINING WALL	350 SF	75.00	26,250.00
0183	6677000000-E	SP	GENERIC PLANTING ITEM RIVER STONE	7 TON	200.00	1,400.00
0184	6680000000-E	SP	GENERIC PLANTING ITEM 12 MONTH AGED HARDWOOD MULCH	190 CY	50.00	9,500.00
0185	6690000000-E	SP	GENERIC PLANTING ITEM TREE PROTECTION FENCE	300 LF	1.30	390.00
0186	6690000000-E	SP	GENERIC PLANTING ITEM WORMSTYLE FENCING	1,350 LF	26.00	35,100.00
0187	6890000000-E	SP	CONCRETE STEPS	6 CY	720.00	4,320.00
0188	6895000000-E	SP	HANDRAIL ON STEPS	28 LF	200.00	5,600.00
0189	6900000000-E	SP	TOPSOIL	100 CY	52.00	5,200.00
0190	6905000000-N	SP	PICNIC TABLE, TERRAZZO & STEEL	3 EA	4,000.00	12,000.00
0191	6915000000-N	SP	OUTDOOR PARK STOVE	2 EA	2,550.00	5,100.00
0192	6945000000-E	SP	3/4" POST TYPE YARD HYDRANT	3 EA	525.00	1,575.00
0193	6970000000-N	SP	GENERIC REST AREA ITEM FLAGPOLE	3 EA	3,350.00	10,050.00
0194	6970000000-N	SP	GENERIC REST AREA ITEM FLAGPOLE & SIGN LIGHTING	4 EA	2,150.00	8,600.00
0195	6970000000-N	SP	GENERIC REST AREA ITEM PICNIC SHELTER, SINGLE PICNIC TABLE STONE VENEER BASE	5 EA	25,000.00	125,000.00
0196	6970000000-N	SP	GENERIC REST AREA ITEM RECYCLING CONTAINER	10 EA	850.00	8,500.00
0197	6970000000-N	SP	GENERIC REST AREA ITEM SITTING BENCH	7 EA	1,750.00	12,250.00

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0198	6970000000-N	SP	GENERIC REST AREA ITEM WASTE CONTAINER	10 EA	765.00	7,650.00
0199	6970000000-N	SP	GENERIC REST AREA ITEM WHEEL STOPS @ H/C PARKING	4 EA	85.00	340.00
0200	6975000000-N	SP	GENERIC REST AREA ITEM (NBL) REST AREA - SOLAR WATER HEATING SYSTEM	Lump Sum LS	20,000.00	20,000.00
0201	6975000000-N	SP	GENERIC REST AREA ITEM (SBL) REST AREA - SOLAR WATER HEATING SYSTEM	Lump Sum LS	20,000.00	20,000.00
0202	6975000000-N	SP	GENERIC REST AREA ITEM ELECTRICAL INSTALLATION FOR (NBL) REST AREA BUILDING	Lump Sum LS	60,100.00	60,100.00
0203	6975000000-N	SP	GENERIC REST AREA ITEM ELECTRICAL INSTALLATION FOR (SBL) REST AREA BUILDING	Lump Sum LS	90,500.00	90,500.00
0204	6975000000-N	SP	GENERIC REST AREA ITEM ELECTRICAL INSTALLATION FOR (SBL) STORAGE BUILDING	Lump Sum LS	5,650.00	5,650.00
0205	6975000000-N	SP	GENERIC REST AREA ITEM GENERAL CONSTRUCTION OF (SBL) REST AREA BUILDING	Lump Sum LS	520,000.00	520,000.00
0206	6975000000-N	SP	GENERIC REST AREA ITEM GENERAL CONSTRUCTION OF (SBL) STORAGE BUILDING	Lump Sum LS	37,750.00	37,750.00
0207	6975000000-N	SP	GENERIC REST AREA ITEM GENERAL RENOVATION OF (NBL) REST AREA BUILDING	Lump Sum LS	410,000.00	410,000.00
0208	6975000000-N	SP	GENERIC REST AREA ITEM LANDSCAPE GRADING (NBL)	Lump Sum LS	1,700.00	1,700.00
0209	6975000000-N	SP	GENERIC REST AREA ITEM LANDSCAPE GRADING (SBL)	Lump Sum LS	12,650.00	12,650.00
0210	6975000000-N	SP	GENERIC REST AREA ITEM MECHANICAL INSTALLATION FOR (NBL) REST AREA BUILDING	Lump Sum LS	30,600.00	30,600.00
0211	6975000000-N	SP	GENERIC REST AREA ITEM MECHANICAL INSTALLATION FOR (SBL) REST AREA BUILDING	Lump Sum LS	48,500.00	48,500.00

Contract Item Sheets For C203202

Line #	ItemNumber	Sec #	Description	Quantity Unit	Unit Bid Price	Amount Bid
0212	6975000000-N	SP	GENERIC REST AREA ITEM PLUMBING INSTALLATION OF (NBL) REST AREA BUILDING	Lump Sum LS	143,300.00	143,300.00
0213	6975000000-N	SP	GENERIC REST AREA ITEM PLUMBING INSTALLATION OF (SBL) REST AREA BUILDING	Lump Sum LS	192,900.00	192,900.00
0214	6975000000-N	SP	GENERIC REST AREA ITEM SITE DEMOLITION (NBL)	Lump Sum LS	15,000.00	15,000.00
0215	6975000000-N	SP	GENERIC REST AREA ITEM SPECIAL REST AREA SIGNAGE	Lump Sum LS	35,500.00	35,500.00
0216	6975000000-N	SP	GENERIC REST AREA ITEM STORMWATER DRAINAGE SYSTEM (NBL)	Lump Sum LS	16,600.00	16,600.00
0217	6975000000-N	SP	GENERIC REST AREA ITEM STORMWATER DRAINAGE SYSTEM (SBL)	Lump Sum LS	24,500.00	24,500.00
0218	6980000000-E	SP	GENERIC REST AREA ITEM LANDSCAPE METAL EDGING	1,790 LF	4.50	8,055.00
0219	6980000000-E	SP	GENERIC REST AREA ITEM STONE SEATWALL	470 LF	275.00	129,250.00
0220	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	15 LF	250.00	3,750.00

TOTAL AMOUNT OF BID FOR ENTIRE PROJECT **$6,151,716.03**

Contract No. C203202

County Haywood

Rev. 5-19-11

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

CORPORATION

The Contractor being duly sworn, solemnly swears (or affirms) that neither he, nor any official, agent or employee 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 this Contract, that the Contractor has not been convicted of violating *N.C.G.S. § 133-24* within the last three years, and that the Contractor intends to do the work with its own bonafide employees or subcontractors and did not bid for the benefit of another contractor.

By submitting this Execution of Contract, Non-Collusion Affidavit and Debarment Certification, the Contractor is certifying his 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

Buchanan and Sons Inc

Full name of Corporation

P.O. Box 123 Whittier, NC 28789

Address as Prequalified

Attest Mark Buchanan
Secretary/~~Assistant Secretary~~
Select appropriate title

By [signature]
~~President~~/Vice President/~~Assistant Vice President~~
Select appropriate title

Mark Buchanan
Print or type Signer's name

Christopher S. Buchanan
Print or type Signer's name

CORPORATE SEAL

Buchanan and Sons Inc. CORPORATE SEAL 2000 NORTH CAROLINA

AFFIDAVIT MUST BE NOTARIZED

Subscribed and sworn to before me this the

7 day of April 2014.

Emily L Knapp (Emily L Knapp)
Signature of Notary Public

of Jackson County

State of North Carolina

My Commission Expires: March 15, 2016

NOTARY SEAL

EMILY L KNAPP NOTARY PUBLIC COUNTY OF JACKSON NORTH CAROLINA

Contract No. C203202
County Haywood

Rev. 5-19-11

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.

Contract No. C203202
County Haywood

Rev. 5-19-11

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. **C203202**

County **Haywood**

ACCEPTED BY THE
DEPARTMENT OF TRANSPORTATION

Contract Officer

4/28/14
Date

Execution of Contract and Bonds
Approved as to Form:

Thomas H. Moore
Asst Attorney General

Contract No. C203202
County Haywood
Bond No. ASA1824-6381

Rev 5-17-11

CONTRACT PAYMENT BOND

Date of Payment Bond Execution	April 11, 2014
Name of Principal Contractor	Buchanan and Sons, Inc.
Name of Surety:	Hudson Insurance Company
Name of Contracting Body:	**North Carolina Department of Transportation**
	Raleigh, North Carolina
Amount of Bond:	$6,151,716.03
Contract ID No.:	C203202
County Name:	Haywood

KNOW ALL MEN BY THESE PRESENTS, That we, the PRINCIPAL CONTRACTOR (hereafter, PRINCIPAL) and SURETY above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the Contracting Body, numbered as shown above and hereto attached:

NOW THEREFORE, if the principal shall promptly make payment to all persons supplying labor and material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Contract No. C203202
County Haywood

Rev 5-17-11

CONTRACT PAYMENT BOND

Affix Seal of Surety Company

Hudson Insurance Company
Print or type Surety Company Name

By Karen K. Beard, Attorney-in-Fact
Print, stamp or type name of Attorney-in-Fact

Karen K. Beard
Signature of Attorney-in-Fact

Susan R. Fussell
Signature of Witness

Susan R. Fussell
Print or type Signer's name

552-B New Haw Creek Road, Asheville, NC 28805
Address of Attorney-in-Fact

Contract No. C203202
County Haywood

Rev 5-17-11

CONTRACT PAYMENT BOND

CORPORATION

SIGNATURE OF CONTRACTOR (Principal)

Buchanan and Sons, Inc.

Full name of Corporation

P O Box 123, Whittier,NC 28789

Address as prequalified

By _____

Signature of ~~President~~, **Vice President**, ~~Assistant Vice President~~

Select appropriate title

Christopher Buchanan

Print or type Signer's name

Affix Corporate Seal

Buchanan and Sons Inc. CORPORATE SEAL 2000 NORTH CAROLINA

Attest _____

Signature of **Secretary**, ~~Assistant Secretary~~

Select appropriate title

Mark Buchanan

Print or type Signer's name

14376

HUDSON INSURANCE GROUP®

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That HUDSON INSURANCE COMPANY, a corporation of the State of Delaware, with offices at 100 William Street, New York, New York, 10038, has made, constituted and appointed, and by these presents, does make, constitute and appoint

Karen K. Beard and Wallace N. Hyde

its true and lawful Attorney(s)-in-Fact, at New York, New York, each of them alone to have full power to act without the other or others, to make, execute and deliver on its behalf, as Surety, bonds and undertakings given for any and all purposes, also to execute and deliver on its behalf as aforesaid renewals, extensions, agreements, waivers, consents or stipulations relating to such bonds or undertakings provided, however, that no single bond or undertaking shall obligate said Company for any portion of the penal sum thereof in excess of the sum of **Ten Million Dollars ($10,000,000.00).**

Such bonds and undertakings when duly executed by said Attorney(s)-in-Fact, shall be binding upon said Company as fully and to the same extent as if signed by the President of said Company under its corporate seal attested by its Secretary.

In Witness Whereof, HUDSON INSURANCE COMPANY has caused these presents to be of its Executive Vice President thereunto duly authorized, on this 27th day of July, 2012 at New York, New York.

(Corporate seal)

HUDSON INSURANCE COMPANY

Attest.....
Dina Daskalakis
Assistant Corporate Secretary

By.....
Christopher T. Suarez
Executive Vice President

STATE OF NEW YORK
COUNTY OF NEW YORK. SS.

On the 27th day of July, 2012 before me personally came Christopher T. Suarez to me known, who being by me duly sworn did depose and say that he is an Executive Vice President of **HUDSON INSURANCE COMPANY**, the corporation described herein and which executed the above instrument, that he knows the seal of said Corporation, that the seal affixed to said instrument is such corporate seal, that it was so affixed by order of the Board of Directors of said Corporation, and that he signed his name thereto by like order.

(Notarial Seal)

.....
ANN M. MURPHY
Notary Public, State of New York
No. 01MU6067553
Qualified in Nassau County
Commission Expires December 10, 2017

STATE OF NEW YORK
COUNTY OF NEW YORK

CERTIFICATION

The undersigned **Dina Daskalakis** hereby certifies:

That the original resolution, of which the following is a true and correct copy, was duly adopted by unanimous written consent of the Board of Directors of Hudson Insurance Company dated July 27th, 2007, and has not since been revoked, amended or modified:

"RESOLVED, that the President, the Executive Vice Presidents, the Senior Vice Presidents and the Vice Presidents shall have the authority and discretion, to appoint such agent or agents, or attorney or attorneys-in-fact, for the purpose of carrying on this Company's surety business, and to empower such agent or agents, or attorney or attorneys-in-fact, to execute and deliver, under this Company's seal or otherwise, bonds obligations, and recognizances, whether made by this Company as surety thereon or otherwise, indemnity contracts, contracts and certificates, and any and all other contracts and undertakings made in the course of this Company's surety business, and renewals, extensions, agreements, waivers, consents or stipulations regarding undertakings so made; and

FURTHER RESOVLED, that the signature of any such Officer of the Company and the Company's seal may be affixed by facsimile to any power of attorney or certification given for the execution of any bond, undertaking, recognizance, contract of indemnity or other written obligation in the nature thereof or related thereto, such signature and seal when so used whether heretofore or hereafter, being hereby adopted by the Company as the original signature of such officer and the original seal of the Company, to be valid and binding upon the Company with the same force and effect as though manually affixed."

THAT the above and foregoing is a full, true and correct copy of Power of Attorney issued by said Company, and of the whole of the original and that the said Power of Attorney is still in full force and effect and has not been revoked, and furthermore that the Resolution of the Board of Directors, set forth in the said Power of Attorney is now in force.

In Witness the hand of the undersigned and the seal of said Corporation this 11th day of April, 2014.

(Corporate seal)

By.....
Dina Daskalakis, Assistant Corporate Secretary

Form PerfA 10 8 2010 (v1)

Contract No. C203202
County Haywood

Rev 5-17-11

Bond No. ASA1824-6381

CONTRACT PERFORMANCE BOND

Date of Performance Bond Execution: April 11, 2014

Name of Principal Contractor: Buchanan and Sons, Inc.

Name of Surety: Hudson Insurance Company

Name of Contracting Body: **North Carolina Department of Transportation**

Raleigh, North Carolina

Amount of Bond: $6,151,716.03

Contract ID No.: C203202

County Name: Haywood

KNOW ALL MEN BY THESE PRESENTS, That we, the PRINCIPAL CONTRACTOR (hereafter, PRINCIPAL) and SURETY above named, are held and firmly bound unto the above named Contracting Body, hereinafter called the Contracting Body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the Contracting Body, numbered as shown above and hereto attached:

NOW THEREFORE, if the principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the Contracting Body, with or without notice to the Surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bound parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Contract No. C203202
County Haywood

Rev 5-17-11

CONTRACT PERFORMANCE BOND

Affix Seal of Surety Company

Hudson Insurance Company
Print or type Surety Company Name

By Karen K. Beard, Attorney-in-Fact
Print, stamp or type name of Attorney-in-Fact

Karen K. Beard
Signature of Attorney-in-Fact

Susan R. Fussell
Signature of Witness

Susan R. Fussell
Print or type Signer's name

552-B New Haw Creek Road, Asheville, NC 28805
Address of Attorney-in-Fact

Contract No. C203202
County Haywood

Rev 5-17-11

CONTRACT PERFORMANCE BOND

CORPORATION

SIGNATURE OF CONTRACTOR (Principal)

Buchanan and Sons, Inc.

Full name of Corporation

P O Box 123, Whittier, NC 28789

Address as prequalified

By _____

Signature of ~~President~~, Vice President, ~~Assistant Vice President~~

Select appropriate title

Christopher Buchanan

Print or type Signer's name

Affix Corporate Seal

Buchanan and Sons Inc. CORPORATE SEAL 2000 NORTH CAROLINA

Attest _____

Signature of Secretary, ~~Assistant Secretary~~

Select appropriate title

Mark Buchanan

Print or type Signer's name

14376

HUDSON INSURANCE GROUP®

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That HUDSON INSURANCE COMPANY, a corporation of the State of Delaware, with offices at 100 William Street, New York, New York, 10038, has made, constituted and appointed, and by these presents, does make, constitute and appoint

Karen K. Beard and Wallace N. Hyde

its true and lawful Attorney(s)-in-Fact, at New York, New York, each of them alone to have full power to act without the other or others, to make, execute and deliver on its behalf, as Surety, bonds and undertakings given for any and all purposes, also to execute and deliver on its behalf as aforesaid renewals, extensions, agreements, waivers, consents or stipulations relating to such bonds or undertakings provided, however, that no single bond or undertaking shall obligate said Company for any portion of the penal sum thereof in excess of the sum of **Ten Million Dollars ($10,000,000.00).**

Such bonds and undertakings when duly executed by said Attorney(s)-in-Fact, shall be binding upon said Company as fully and to the same extent as if signed by the President of said Company under its corporate seal attested by its Secretary.

In Witness Whereof, HUDSON INSURANCE COMPANY has caused these presents to be of its Executive Vice President thereunto duly authorized, on this 27th day of July, 2012 at New York, New York.

(Corporate seal)

HUDSON INSURANCE COMPANY

Attest.....
Dina Daskalakis
Assistant Corporate Secretary

By.....
Christopher T. Suarez
Executive Vice President

STATE OF NEW YORK
COUNTY OF NEW YORK. SS.

On the 27th day of July, 2012 before me personally came Christopher T. Suarez to me known, who being by me duly sworn did depose and say that he is an Executive Vice President of **HUDSON INSURANCE COMPANY**, the corporation described herein and which executed the above instrument, that he knows the seal of said Corporation, that the seal affixed to said instrument is such corporate seal, that it was so affixed by order of the Board of Directors of said Corporation, and that he signed his name thereto by like order.

(Notarial Seal)

ANN M MURPHY
NOTARY PUBLIC
STATE OF NEW YORK
01MU6067553
QUALIFIED IN NASSAU COUNTY
COMMISSION EXPIRES 12-10-2017

.....
ANN M. MURPHY
Notary Public, State of New York
No. 01MU6067553
Qualified in Nassau County
Commission Expires December 10, 2017

CERTIFICATION

STATE OF NEW YORK
COUNTY OF NEW YORK

The undersigned **Dina Daskalakis** hereby certifies:

That the original resolution, of which the following is a true and correct copy, was duly adopted by unanimous written consent of the Board of Directors of Hudson Insurance Company dated July 27th, 2007, and has not since been revoked, amended or modified:

"RESOLVED, that the President, the Executive Vice Presidents, the Senior Vice Presidents and the Vice Presidents shall have the authority and discretion, to appoint such agent or agents, or attorney or attorneys-in-fact, for the purpose of carrying on this Company's surety business, and to empower such agent or agents, or attorney or attorneys-in-fact, to execute and deliver, under this Company's seal or otherwise, bonds obligations, and recognizances, whether made by this Company as surety thereon or otherwise, indemnity contracts, contracts and certificates, and any and all other contracts and undertakings made in the course of this Company's surety business, and renewals, extensions, agreements, waivers, consents or stipulations regarding undertakings so made; and

FURTHER RESOVLED, that the signature of any such Officer of the Company and the Company's seal may be affixed by facsimile to any power of attorney or certification given for the execution of any bond, undertaking, recognizance, contract of indemnity or other written obligation in the nature thereof or related thereto, such signature and seal when so used whether heretofore or hereafter, being hereby adopted by the Company as the original signature of such officer and the original seal of the Company, to be valid and binding upon the Company with the same force and effect as though manually affixed."

THAT the above and foregoing is a full, true and correct copy of Power of Attorney issued by said Company, and of the whole of the original and that the said Power of Attorney is still in full force and effect and has not been revoked, and furthermore that the Resolution of the Board of Directors, set forth in the said Power of Attorney is now in force.

In Witness the hand of the undersigned and the seal of said Corporation this 11th day of April, 2014.

(Corporate seal)

By.....
Dina Daskalakis, Assistant Corporate Secretary

Form PerIA 10 8 2010 (v1)