

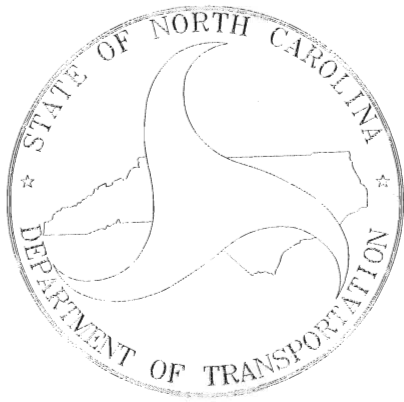
**SPECIFICATIONS FOR:**

# **LINCOLN TON EQUIPMENT SHOP**

LINCOLN COUNTY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

**ID# 09-07920-01A**



Architect / Engineer:

FACILITIES DESIGN  
GENERAL SERVICES DIVISION, NCDOT  
1 SOUTH WILMINGTON STREET  
RALEIGH, NORTH CAROLINA 27601

7 December 2011

SET NO. \_\_\_\_

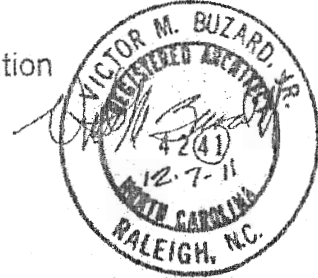


LINCOLNTON EQUIPMENT SHOP

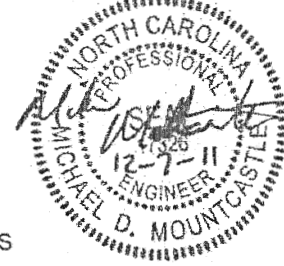
**PROJECT:** LINCOLNTON EQUIPMENT SHOP  
NC Department of Transportation  
Hendersonville, NC

**OWNER:** NC Department of Transportation

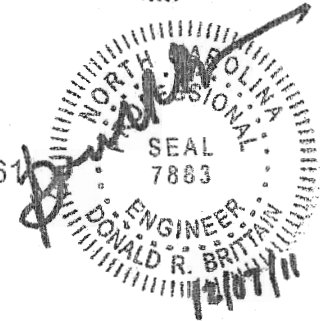
**ARCHITECT:** Facilities Design, NCDOT  
Raleigh, NC (919) 715-0400  
Victor M. Buzard, Jr., RA



**ENGINEERS:**  
**STRUCTURAL:** Facilities Design, NCDOT  
Raleigh, NC (919) 715-0400  
Michael D. Mountcastle, PE



**PLUMBING,  
MECHANICAL &  
ELECTRICAL:** Brittain Engineering Associates  
Hickory, NC (828) 328-1813  
Donald R. Brittain, PE



**SITE / CIVIL:** West Consultants PLLC  
Morganton, NC (828) 433-5661  
Todd Poteet, PE





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# LINCOLNTON EQUIPMENT SHOP

## NOTICE TO BIDDERS

Sealed proposals will be received by Vic Buzard, NCDOT, in the County Maintenance Office, at 499 Roper Drive, Lincolnton, NC 28092 up to **1:00 PM** for Single Prime bids, **September 5, 2012**, and immediately thereafter publicly opened and read for the furnishing of labor, material and equipment entering into the construction of the **Lincolnton Equipment Shop** building in Lincolnton, North Carolina.

The project consists of the construction of a new 9,495 sf Equipment Shop with a 2,171 sf mezzanine, and related Site Work.

Bids will be received a Single Prime Contract, combined bid for all work including General, Plumbing, Mechanical, and Electrical. All proposals shall be lump sum.

### Pre-Bid Meeting

An open mandatory pre-bid meeting will be held for all interested bidders and vendors at **10:30 am on 22 day, August, 2012** at the County Maintenance Office indicated above to verify existing conditions on this project.

The meeting is also to identify preferred brand alternates and their performance standards that the owner will consider for approval on this project.

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

**<http://www.ncdot.gov/doh/operations/division12/>**

Firms bidding this do not have to be Prequalified by NCDOT.

All questions during the Bid Period are to be directed to the Architect, Vic Buzard and Donnie Smith, in the form of a written RFI, via e-mail: [vbuzard@ncdot.gov](mailto:vbuzard@ncdot.gov) / [donniesmith@ncdot.gov](mailto:donniesmith@ncdot.gov) . **ALL DOCUMENTATION, DURING THE BID PERIOD, WILL BE POSTED ON THE WEBSITE ONLY – IT WILL NOT BE DISTRIBUTED VIA E-MAIL.** IT IS THE RESPONSIBILITY OF ALL PARTICIPATING IN THE BID TO CHECK THE WEBSITE AT INTERVALS FOR ADDENDA, LIST OF REGISTERED GENERAL CONTRACTORS, ETC. THE LIST OF GENERAL CONTRACTORS ATTENDING THE MANDATORY PRE-BID WILL BE POSTED ON THE WEBSITE AFTER THE PREBID MEETING IN ADDENDUM NO. 1.

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

**NOTE:** The bidder shall identify on its bid proposal the minority business participation it will use on the project (*Identification of Minority Business Participation*) form and shall include either *Affidavit A* or *Affidavit B* as applicable. Forms and instructions are included within the Proposal Form in the bid documents. Failure to complete these forms is grounds for rejection of the bid. (GS143-128.2c Effective 1/1/2002.)

All contractors are hereby notified that they must have proper license as required under the state laws governing their respective trades.

General contractors are notified that Chapter 87, Article 1, General Statutes of North Carolina, will be observed in receiving and awarding general contracts. General contractors submitting bids on this project must have license classification for Building Construction.

## LINCOLNTON EQUIPMENT SHOP

Each proposal shall be accompanied by a cash deposit or a certified check drawn on some bank or trust company, insured by the Federal Deposit Insurance Corporation, of an amount equal to not less than five percent (5%) of the proposal, or in lieu thereof a bidder may offer a bid bond of five percent (5%) of the bid executed by a surety company licensed under the laws of North Carolina to execute the contract in accordance with the bid bond. Said deposit shall be retained by the owner as liquidated damages in event of failure of the successful bidder to execute the contract within ten days after the award or to give satisfactory surety as required by law.

A performance bond and a payment bond will be required for one hundred percent (100%) of the contract price.

Payment will be made based on ninety-five percent (95%) of monthly estimates and final payment made upon completion and acceptance of work.

No bid may be withdrawn after the scheduled closing time for the receipt of bids for a period of 30 days.

The owner reserves the right to reject any or all bids and to waive informalities.

**Designer:**

Victor M. Buzard, Jr., RA  
Facilities Design Unit, NCDOT  
1 South Wilmington Street  
Raleigh, North Carolina 27601  
(919) 707-4550

**Owner:**

Priscilla T. Williams, PE, Director  
Facilities Management Division, NCDOT  
1 South Wilmington Street  
Raleigh, North Carolina 27601  
(919) 707-4540



**INSTRUCTIONS TO BIDDERS  
AND  
GENERAL CONDITIONS OF THE CONTRACT**

**STANDARD FORM FOR CONSTRUCTION PROJECTS**

**STATE CONSTRUCTION OFFICE  
NORTH CAROLINA  
DEPARTMENT OF ADMINISTRATION**

**Form OC-15**

**This document is intended for use on State capital construction projects and shall not be used on any project that is not reviewed and approved by the State Construction Office. Extensive modification to the General Conditions by means of “Supplementary General Conditions” is strongly discouraged. State agencies and institutions may include special requirements in “Division 1 – General Requirements” of the specifications, where they do not conflict with the General Conditions.**

**Twenty Third Edition January 2002  
Revised March 2002**

## INSTRUCTIONS TO BIDDERS

For a proposal to be considered it must be in accordance with the following instructions:

### 1. PROPOSALS

Proposals must be made in strict accordance with the Form of Proposal provided therefor, and all blank spaces for bids, alternates, and unit prices applicable to bidder's work shall be properly filled in. When requested alternates are not bid, the proposal may be considered incomplete. The bidder agrees that bid on Form of Proposal detached from specifications will be considered and will have the same force and effect as if attached thereto. Photocopied or faxed proposals will not be considered. Numbers shall be stated both in writing and in figures for the base bids and alternates.

Any modifications to the Form of Proposal (including alternates and/or unit prices) will disqualify the bid and may cause the bid to be rejected.

The bidder shall fill in the Form of Proposal as follows:

- a. If the documents are executed by a sole owner, that fact shall be evidenced by the word "Owner" appearing after the name of the person executing them.
- b. If the documents are executed by a partnership, that fact shall be evidenced by the word "Co-Partner" appearing after the name of the partner executing them.
- c. If the documents are executed on the part of a corporation, they shall be executed by either the president or the vice president and attested by the secretary or assistant secretary in either case, and the title of the office of such persons shall appear after their signatures. The seal of the corporation shall be impressed on each signature page of the documents.
- d. If the proposal is made by a joint venture, it shall be executed by each member of the joint venture in the above form for sole owner, partnership or corporation, whichever form is applicable.
- e. All signatures shall be properly witnessed.
- f. If the contractor's license of a bidder is held by a person other than an owner, partner or officer of a firm, then the licensee shall also sign and be a party to the proposal. The title "Licensee" shall appear under his/her signature.

Proposals shall be addressed as indicated in the Advertisement for Bids and shall be delivered, enclosed in an opaque sealed envelope, marked "Proposal" and bearing the title of the work, name of the bidder, and the contractor's license number of the bidder. Bidders shall clearly mark on the outside of the bid envelope which contract(s) they are bidding.

Bidder shall identify on the bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit listing good faith efforts or an affidavit indicating work under contract will be self-performed, as required by G.S. 143-128.2(c) and G.S. 143-128.2(f). Failure to comply with these requirements is grounds for rejection of the bid.

For projects bid in the single-prime alternative, the names and license numbers of major subcontractors shall be listed on the proposal form.

It shall be the specific responsibility of the bidder to deliver his bid to the proper official at the selected place and prior to the announced time for the opening of bids. Later delivery of a bid for any reason, including delivery by the United States Postal Service, shall disqualify the bid.

Modifications of previously deposited bids will be acceptable only if delivered in writing or by telegram or fax to the place of the bid opening prior to the time for opening bids. Telegraphic and fax modifications must be confirmed in writing within 72 hours of the opening of bids.

Unit prices quoted in the proposal shall include overhead and profit and shall be the full compensation for the contractor's cost involved in the work. See General Conditions, Article 19c-1.

## **2. EXAMINATION OF CONDITIONS**

It is understood and mutually agreed that by submitting a bid the bidder acknowledges that he has carefully examined all documents pertaining to the work, the location, accessibility and general character of the site of the work and all existing buildings and structures within and adjacent to the site, and has satisfied himself as to the nature of the work, the condition of existing buildings and structures, the conformation of the ground, the character, quality and quantity of the material to be encountered, the character of the equipment, machinery, plant and any other facilities needed preliminary to and during prosecution of the work, the general and local conditions, the construction hazards, and all other matters, including, but not limited to, the labor situation which can in any way affect the work under the contract, and including all safety measures required by the Occupational Safety and Health Act of 1970 and all rules and regulations issued pursuant thereto. It is further mutually agreed that by submitting a proposal the bidder acknowledges that he has satisfied himself as to the feasibility and meaning of the plans, drawings, specifications and other contract documents for the construction of the work and that he accepts all the terms, conditions and stipulations contained therein; and that he is prepared to work in cooperation with other contractors performing work on the site.

Reference is made to contract documents for the identification of those surveys and investigation reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by the designer in preparing the documents. The owner will make copies of all such surveys and reports available to the bidder upon request.

Each bidder may, at his own expense, make such additional surveys and investigations as he may deem necessary to determine his bid price for the performance of the work. Any on-site investigation shall be done at the convenience of the owner. Any reasonable request for access to the site will be honored by the owner.

## **3. BULLETINS AND ADDENDA**

Any addenda to specifications issued during the time of bidding are to be considered covered in the proposal and in closing a contract they will become a part thereof. It shall be the bidder's responsibility to ascertain prior to bid time the addenda issued and to see that his bid includes any changes thereby required.

Should the bidder find discrepancies in, or omission from, the drawings or documents or should he be in doubt as to their meaning, he shall at once notify the designer who will send written instructions in the form of addenda to all bidders. Notification should be no later than

seven (7) days prior to the date set for receipt of bids. Neither the owner nor the designer will be responsible for any oral instructions.

All addenda shall be acknowledged by the bidder(s) on the Form of Proposal.

#### **4. BID SECURITY**

Each proposal shall be accompanied by a cash deposit or a certified check drawn on some bank or trust company insured by the Federal Deposit Insurance Corporation, or a bid bond in an amount equal to not less than five percent (5%) of the proposal, said deposit to be retained by the owner as liquidated damages in event of failure of the successful bidder to execute the contract within ten (10) days after the award or to give satisfactory surety as required by law (G.S. 143-129).

Bid bond shall be conditioned that the surety will, upon demand, forthwith make payment to the obligee upon said bond if the bidder fails to execute the contract. The owner may retain bid securities of any bidder(s) who may have a reasonable chance of award of contract for the full duration of time stated in the Notice to Bidders. Other bid securities may be released sooner, at the discretion of the owner. All bid securities (cash or certified checks) shall be returned to the bidders promptly after award of contracts, and no later than seven (7) days after expiration of the holding period stated in the Notice to Bidders. Standard Form of Bid Bond is included in these specifications (Section 304).

#### **5. RECEIPT OF BIDS**

Bids shall be received in strict accordance with requirements of the General Statutes of North Carolina. Bid security shall be required as prescribed by statute. Prior to opening of any bids on the project, the bidder will be permitted to change or withdraw his bid. Guidelines for opening of public construction bids are available from the State Construction Office.

#### **6. OPENING OF BIDS**

Upon opening, all bids shall be read aloud. Once any bid is opened, there shall not be any withdrawal of bids by any bidder and no bids may be returned by the designer to any bidder. After the bid opening, a bidder may request that his bid be withdrawn from consideration without forfeiture of his bid security in accordance with the provisions of the North Carolina General Statute 143-129.1. After the opening of bids, no bid may be withdrawn, except under the provisions of General Statute 143-129.1, for a period of thirty days unless otherwise specified. Should the successful bidder default and fail to execute a contract, the contract may be awarded to the next lowest and responsible bidder. The owner reserves the unqualified right to reject any and all bids. Reasons for rejection may include, but shall not be limited to, the following:

- a. If the Form of Proposal furnished to the bidder is not used or is altered.
- b. If the bidder fails to insert a price for all bid items, alternate and unit prices requested.
- c. If the bidder adds any provisions reserving the right to accept or reject any award.
- d. If there are unauthorized additions or conditional bids, or irregularities of any kind which tend to make the proposal incomplete, indefinite or ambiguous as to its meaning.
- e. If the bidder fails to complete the proposal form where information is requested so the bid may be properly evaluated by the owner.

- f. If the unit prices contained in the bid schedule are unacceptable to the owner and the State Construction Office.
- g. If the bidder fails to comply with other instructions stated herein.

## **7. BID EVALUATION**

The award of the contract will be made to the lowest responsible bidder as soon as practical. The owner may award on the basis of the base bid and any alternates the owner chooses.

Before awarding a contract, the owner may require the apparent low bidder to qualify himself to be a responsible bidder by furnishing any or all of the following data:

- a. The latest financial statement showing assets and liabilities of the company or other information satisfactory to the owner.
- b. A listing of completed projects of similar size.
- c. Permanent name and address of place of business.
- d. The number of regular employees of the organization and length of time the organization has been in business under present name.
- e. The name and home office address of the surety proposed and the name and address of the responsible local claim agent.
- f. The names of members of the firms who hold appropriate trade licenses, together with license numbers.

Failure or refusal to furnish any of the above information, if requested, shall constitute a basis for disqualification of any bidder.

In determining the lowest responsible, responsive bidder, the owner shall take into consideration the bidder's compliance with the requirements of G.S. 143-128.2(c), the past performance of the bidder on construction contracts for the State with particular concern given to completion times, quality of work, cooperation with other contractors, and cooperation with the designer and owner. Failure of the low bidder to furnish affidavit and/or documentation as required by G.S. 143-128.2(c) may constitute a basis for disqualification of the bid.

Should the owner adjudge that the apparent low bidder is not the lowest responsible, responsive bidder by virtue of the above information, said apparent low bidder will be so notified and his bid security shall be returned to him.

## **8. PERFORMANCE BOND**

The successful bidder, upon award of contract, shall furnish a performance bond in an amount equal to 100 percent of the contract price. See Article 35, General Conditions.

## **9. PAYMENT BOND**

The successful bidder, upon award of contract, shall furnish a payment bond in an amount equal to 100 percent of the contract price. See Article 35, General Conditions.

## 10. PAYMENTS

Payments to the successful bidders (contractors) will be made on the basis of monthly estimates. See Article 31, General Conditions.

## 11. PRE-BID CONFERENCE

Prior to the date set for receiving bids, the Designer may arrange and conduct a Pre-Bid Conference for all prospective bidders. The purpose of this conference is to review project requirements and to respond to questions from prospective bidders and their subcontractors or material suppliers related to the intent of bid documents. Attendance by prospective bidders shall be as required by the "Notice to Bidders".

## 12. SUBSTITUTIONS

In accordance with the provisions of G.S. 133-3, material, product, or equipment substitutions proposed by the bidders to those specified herein can only be considered during the bidding phase until ten (10) days prior to the receipt of bids when submitted to the Designer with sufficient data to confirm material, product, or equipment equality. Proposed substitutions submitted after this time will be considered only as potential change order.

Submittals for proposed substitutions shall include the following information:

- a. Name, address, and telephone number of manufacturer and supplier as appropriate.
- b. Trade name, model or catalog designation.
- c. Product data including performance and test data, reference standards, and technical descriptions of material, product, or equipment. Include color samples and samples of available finishes as appropriate.
- d. Detailed comparison with specified products including performance capabilities, warranties, and test results.
- e. Other pertinent data including data requested by the Designer to confirm product equality.

If a proposed material, product, or equipment substitution is deemed equal by the Designer to those specified, all bidders of record will be notified by Addendum.

## GENERAL CONDITIONS OF THE CONTRACT

The use or reproduction of this document or any part thereof is authorized for and limited to use on projects of the State of North Carolina, and is distributed by, through and at the discretion of the State Construction Office, Raleigh, North Carolina, for that distinct and sole purpose.

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## ARTICLE 1 - DEFINITIONS

- a. The **contract documents** consist of the Notice to Bidders; Instructions to Bidders; General Conditions of the Contract; special conditions if applicable; Supplementary General Conditions; the drawing and specifications, including all bulletins, addenda or other modifications of the drawings and specifications incorporated into the documents prior to their execution; the proposal; the contract; the performance bond; the payment bond; insurance certificates; the approval of the attorney general; and the certificate of the Office of State Budget and Management. All of these items together form the contract.
- b. The **owner** is the State of North Carolina through the agency named in the contract.
- c. The **designer(s)** are those referred to within this contract, or their authorized representatives. The designer(s), as referred to herein, shall mean architect and/or engineer. They will be referred to hereinafter as if each were of the singular number, masculine gender.
- d. The **contractor**, as referred to hereinafter, shall be deemed to be either of the several contracting parties called the "Party of the First Part" in either of the several contracts in connection with the total project. Where, in special instances hereinafter, a particular contractor is intended, an adjective precedes the word "contractor," as "general," "heating," etc. For the purposes of a single prime contract, the term Contractor shall be deemed to be the single contracting entity identified as the "Party of the First Part" in the single Construction Contract. Any references or adjectives that name or infer multiple prime contractors shall be interpreted to mean the single prime Contractor.
- e. A **subcontractor**, as the term is used herein, shall be understood to be one who has entered into a direct contract with a contractor, and includes one who furnishes materials worked to a special design in accordance with plans and specifications covered by the contract, but does not include one who only sells or furnishes materials not requiring work so described or detailed.
- f. **Written notice** shall be defined as notice in writing delivered in person to the contractor, or to a partner of the firm in the case of a partnership, or to a member of the contracting organization, or to an officer of the organization in the case of a corporation, or sent to the last known business address of the contracting organization by registered mail.
- g. **Work**, as used herein as a noun, is intended to include materials, labor, and workmanship of the appropriate contractor.
- h. The **project** is the total construction work to be performed under the contract documents by the several contractors.
- i. **Project Expediter**, as used herein, is an entity stated in the contract documents, designated to effectively facilitate scheduling and coordination of work activities. See Article 14(f) for responsibilities of a Project Expediter. **For the purposes of a single prime contract, the single prime contractor shall be designated as the Project Expediter.**
- j. **Change order**, as used herein, shall mean a written order to the contractor subsequent to the signing of the contract authorizing a change in the contract. The change order shall be signed by the contractor, designer and the owner, and approved by the State Construction Office, in that order (Article 19).

- k. **Field Order**, as used herein, shall mean a written approval for the contractor to proceed with the work requested by owner prior to issuance of a formal Change Order. The field order shall be signed by the contractor, designer, owner, and State Construction Office.
- l. **Time of completion**, as stated in the contract documents, is to be interpreted as consecutive calendar days measured from the date established in the written Notice to Proceed, or such other date as may be established herein (Article 23).
- m. **Liquidated damages**, as stated in the contract documents, is an amount reasonably estimated in advance to cover the losses incurred by the owner by reason of failure of the contractor(s) to complete the work within the time specified.
- n. **Surety**, as used herein, shall mean the bonding company or corporate body which is bound with and for the contractor, and which engages to be responsible for the contractor and his acceptable performance of the work.
- o. **Routine written communications between the Designer and the Contractor** are any communication other than a "request for information" provided in letter, memo, or transmittal format, sent by mail, courier, electronic mail, or facsimile. Such communications can not be identified as "request for information".
- p. **Clarification or Request for information (RFI)** is a request from the Contractor seeking an interpretation or clarification by the Designer relative to the contract documents. The RFI, which shall be labeled (RFI), shall clearly and concisely set forth the issue or item requiring clarification or interpretation and why the response is needed. The RFI must set forth the Contractor's interpretation or understanding of the contract documents requirements in question, along with reasons for such an understanding.
- q. **Approval** means written or imprinted acknowledgement that materials, equipment or methods of construction are acceptable for use in the work.
- r. **Inspection** shall mean examination or observation of work completed or in progress to determine its compliance with contract documents.
- s. **"Equal to" or "approved equal"** shall mean materials, products, equipment, assemblies, or installation methods considered equal by the bidder in all characteristics (physical, functional, and aesthetic) to those specified in the contract documents.
- t. **"Substitution" or "substitute"** shall mean materials, products, equipment, assemblies, or installation methods deviating in at least one characteristic (physical, functional, or aesthetic) from those specified, but which in the opinion of the bidder would improve competition and/or enhance the finished installation.

## ARTICLE 2 - INTENT AND EXECUTION OF DOCUMENTS

- a. The drawings and specifications are complementary, one to the other. That which is shown on the drawings or called for in the specifications shall be as binding as if it were both called for and shown. The intent of the drawings and specifications is to establish the scope of all labor, materials, transportation, equipment, and any and all other things necessary to provide a complete job. In case of discrepancy or disagreement in the contract documents, the order of precedence shall be: Form of Contract, specifications, large-scale detail drawings, small-scale drawings.

- b. The wording of the specifications shall be interpreted in accordance with common usage of the language except that words having a commonly used technical or trade meaning shall be so interpreted in preference to other meanings.
- c. The contractor shall execute each copy of the proposal, contract, performance bond and payment bond as follows:
  - 1. If the documents are executed by a sole owner, that fact shall be evidenced by the word "Owner" appearing after the name of the person executing them.
  - 2. If the documents are executed by a partnership, that fact shall be evidenced by the word "Co-Partner" appearing after the name of the partner executing them.
  - 3. If the documents are executed on the part of a corporation, they shall be executed by either the president or the vice president and attested by the secretary or assistant secretary in either case, and the title of the office of such persons shall appear after their signatures. The seal of the corporation shall be impressed on each signature page of the documents.
  - 4. If the documents are made by a joint venture, they shall be executed by each member of the joint venture in the above form for sole owner, partnership or corporation, whichever form is applicable to each particular member.
  - 5. All signatures shall be properly witnessed.
  - 6. If the contractor's license is held by a person other than an owner, partner or officer of a firm, then the licensee shall also sign and be a party to the contract. The title "Licensee" shall appear under his/her signature.
  - 7. The bonds shall be executed by an attorney-in-fact. There shall be attached to each copy of the bond a certified copy of power of attorney properly executed and dated.
  - 8. Each copy of the bonds shall be countersigned by an authorized individual agent of the bonding company licensed to do business in North Carolina. The title "Licensed Resident Agent" shall appear after the signature.
  - 9. The seal of the bonding company shall be impressed on each signature page of the bonds.
  - 10. The contractor's signature on the performance bond and the payment bond shall correspond with that on the contract.

### **ARTICLE 3 - CLARIFICATIONS AND DETAIL DRAWINGS**

- a. In such cases where the nature of the work requires clarification by the designer, such clarification shall be furnished by the designer with reasonable promptness by means of written instructions or detail drawings, or both. Clarifications and drawings shall be consistent with the intent of contract documents, and shall become a part thereof.
- b. The contractor(s) and the designer shall prepare, if deemed necessary, a schedule fixing dates upon which foreseeable clarifications will be required. The schedule will be subject to addition or change in accordance with progress of the work. The designer shall furnish drawings or clarifications in accordance with that schedule. The contractor shall not proceed with the work without such detail drawings and/or written clarifications.

#### **ARTICLE 4 - COPIES OF DRAWINGS AND SPECIFICATIONS**

The designer shall furnish free of charge to the contractors copies of plans and specifications as follows:

- a. General contractor - Up to twelve (12) sets of general contractor drawings and specifications, up to six (6) sets of which shall include drawings and specifications of all other contracts, plus a clean set of black line prints on white paper of all appropriate drawings, upon which the contractor shall clearly and legibly record all work-in-place that is at variance with the contract documents.
- b. Each other contractor - Up to six (6) sets of the appropriate drawings and specifications, up to three (3) sets of which shall include drawings and specifications of all other contracts, plus a clean set of black line prints on white paper of all appropriate drawings, upon which the contractor shall clearly and legibly record all work-in-place that is at variance with the contract documents.
- c. Additional sets shall be furnished at cost, including mailing, to the contractor upon request by the contractor. This cost shall be stated in the bidding documents.
- d. For the purposes of a single-prime contract, the contractor shall receive up to 30 sets of drawings and specifications, plus a clean set of black line prints on white paper of all appropriate drawings, upon which the contractor shall clearly and legibly record all work-in-place that is at variance with the contract documents.

#### **ARTICLE 5 - SHOP DRAWINGS, SUBMITTALS, SAMPLES, DATA**

- a. Within 30 consecutive calendar days after the notice to proceed, each prime contractor shall submit a schedule for anticipated submission of all shop drawings, product data, samples, and similar submittals to the Project Expediter and the Designer. This schedule shall indicate the items, relevant specification sections, other related submittal, data, and the date when these items will be furnished to the designer.
- b. The Contractor shall review, approve and submit to the Designer all Shop or Setting Drawings, Product Data, Samples, Color Charts, and similar submittal data required or reasonably implied by the Contract Documents. Required Submittals shall bear the Contractor's stamp of approval, any exceptions to the Contract Documents shall be noted on the submittals, and copies of all submittals shall be of sufficient quantity for the Designer to retain up to three (3) copies of each submittal for his own use plus additional copies as may be required by the Contractor. Submittals shall be presented to the Designer with reasonable promptness and time so as to cause no delay in the activities of the Owner or of separate Contractors.
- c. The Designer shall review required submittals promptly, noting desired corrections if any, and retaining three (3) copies for his use. The remaining copies of each submittal shall be returned to the Contractor not later than twenty (20) days from the date of receipt by the Designer, for the Contractor's use or for corrections and resubmittal as noted by the Designer. When resubmittals are required, the submittal procedure shall be the same as for the original submittals.
- d. Approval of shop drawings by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with the design or terms of the contract documents nor from responsibility of errors of any sort in the shop drawings, unless such lack of compliance or errors first have been called in writing to the attention of the Designer by the Contractor.

## **ARTICLE 6 - WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE**

- a. The contractor shall maintain, in readable condition at his job office, one complete set of working drawings and specifications for his work including all shop drawings. Such drawings and specifications shall be available for use by the designer or his authorized representative.
- b. The contractor shall maintain at the job office, a day-to-day record of work-in-place that is at variance with the contract documents. Such variations shall be fully noted on project drawings by the contractor and submitted to the designer upon project completion and no later than 30 days after acceptance of the project.

## **ARTICLE 7 - OWNERSHIP OF DRAWINGS AND SPECIFICATIONS**

All drawings and specifications are instruments of service and remain the property of the owner. The use of these instruments on work other than this contract without permission of the owner is prohibited. All copies of drawings and specifications other than contract copies shall be returned to the owner upon request after completion of the work.

## **ARTICLE 8 - MATERIALS, EQUIPMENT, EMPLOYEES**

- a. The contractor shall, unless otherwise specified, supply and pay for all labor, transportation, materials, tools, apparatus, lights, power, heat, sanitary facilities, water, scaffolding and incidentals necessary for the completion of his work, and shall install, maintain and remove all equipment of the construction, other utensils or things, and be responsible for the safe, proper and lawful construction, maintenance and use of same, and shall construct in the best and most workmanlike manner, a complete job and everything incidental thereto, as shown on the plans, stated in the specifications, or reasonably implied therefrom, all in accordance with the contract documents.
- b. All materials shall be new and of quality specified, except where reclaimed material is authorized herein and approved for use. Workmanship shall at all times be of a grade accepted as the best practice of the particular trade involved, and as stipulated in written standards of recognized organizations or institutes of the respective trades except as exceeded or qualified by the specifications.
- c. Upon notice, the contractor shall furnish evidence as to quality of materials.
- d. Products are generally specified by ASTM or other reference standard and/or by manufacturer's name and model number or trade name. When specified only by reference standard, the Contractor may select any product meeting this standard, by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the Contractor has the option of using any product and manufacturer combination listed. However, the contractor shall be aware that the cited examples are used only to denote the quality standard of product desired and that they do not restrict bidders to a specific brand, make, manufacturer or specific name; that they are used only to set forth and convey to bidders the general style, type, character and quality of product desired; and that equivalent products will be acceptable. Request for substitution of materials, items, or equipment shall be submitted to the designer for approval or disapproval; such approval or disapproval shall be made by the designer prior to the opening of bids.
- e. Each contractor shall obtain written approval from the designer for the use of products, materials, equipment, assemblies or installation methods claimed as equal to those

specified. Such approvals must be obtained as soon after contract awards as possible and before any materials are ordered. Applications for approvals shall be made by the contractor and not by subcontractors or material suppliers within thirty (30) days following award of contract. When the submittal schedule provided under Article 5a is approved, no further substitutions will be permitted except in unusual or extenuating circumstances. If no list is submitted, the contractor shall supply materials specified.

- f. The designer is the judge of equality for proposed substitution of products, materials or equipment.
- g. If at any time during the construction and completion of the work covered by these contract documents, the conduct of any workman of the various crafts be adjudged a nuisance to the owner or designer, or if any workman be considered detrimental to the work, the contractor shall order such parties removed immediately from grounds.

#### **ARTICLE 9 - ROYALTIES, LICENSES AND PATENTS**

It is the intention of the contract documents that the work covered herein will not constitute in any way infringement of any patent whatsoever unless the fact of such patent is clearly evidenced herein. The contractor shall protect and save harmless the owner against suit on account of alleged or actual infringement. The contractor shall pay all royalties and/or license fees required on account of patented articles or processes, whether the patent rights are evidenced hereinafter.

#### **ARTICLE 10 - PERMITS, INSPECTIONS, FEES, REGULATIONS**

- a. The contractor shall give all notices and comply with all laws, ordinances, codes, rules and regulations bearing on the conduct of the work under this contract. If the contractor observes that the drawings and specifications are at variance therewith, he shall promptly notify the designer in writing. See Instructions to Bidders, Paragraph 3, Bulletins and Addenda. Any necessary changes required after contract award shall be made by change order in accordance with Article 19. If the contractor performs any work knowing it to be contrary to such laws, ordinances, codes, rules and regulations, and without such notice to the designer, he shall bear all cost arising therefrom. Additional requirements implemented after bidding will be subject to equitable negotiations.
- b. All work under this contract shall conform to the North Carolina State Building Code and other State, local and national codes as are applicable. The cost of all required inspections and permits shall be the responsibility of the contractor.
- c. Projects constructed by the State of North Carolina or by any agency or institution of the State are not subject to inspection by any county or municipal authorities and are not subject to county or municipal building codes. The contractor shall, however, cooperate with the county or municipal authorities by obtaining building permits. Permits shall be obtained at no cost.
- d. Projects involving local funding (community colleges) are subject to county and municipal building codes and inspection by local authorities. The contractor shall pay the cost of these permits and inspections.

## ARTICLE 11 - PROTECTION OF WORK, PROPERTY AND THE PUBLIC

- a. The contractors shall be jointly responsible for the entire site and the building or construction of the same and provide all the necessary protections, as required by the owner or designer, and by laws or ordinances governing such conditions. They shall be responsible for any damage to the owner's property, or of that of others on the job, by them, their personnel, or their subcontractors, and shall make good such damages. They shall be responsible for and pay for any damages caused to the owner. All contractors shall have access to the project at all times.
- b. The contractor shall provide cover and protect all portions of the structure when the work is not in progress, provide and set all temporary roofs, covers for doorways, sash and windows, and all other materials necessary to protect all the work on the building, whether set by him, or any of the subcontractors. Any work damaged through the lack of proper protection or from any other cause, shall be repaired or replaced without extra cost to the owner.
- c. No fires of any kind will be allowed inside or around the operations during the course of construction without special permission from the designer.
- d. The contractor shall protect all trees and shrubs designated to remain in the vicinity of the operations by building substantial boxes around same. He shall barricade all walks, roads, etc., as directed by the designer to keep the public away from the construction. All trenches, excavations or other hazards in the vicinity of the work shall be well barricaded and properly lighted at night.
- e. The contractor shall provide all necessary safety measures for the protection of all persons on the job, including the requirements of the A.G.C. *Accident Prevention Manual in Construction*, as amended, and shall fully comply with all state laws or regulations and North Carolina State Building Code requirements to prevent accident or injury to persons on or about the location of the work. He shall clearly mark or post signs warning of hazards existing, and shall barricade excavations, elevator shafts, stairwells and similar hazards. He shall protect against damage or injury resulting from falling materials and he shall maintain all protective devices and signs throughout the progress of the work.
- f. The contractor shall adhere to the rules, regulations and interpretations of the North Carolina Department of Labor relating to Occupational Safety and Health Standards for the Construction Industry (Title 29, Code of Federal Regulations, Part 1926, published in Volume 39, Number 122, Part II, June 24, 1974, *Federal Register*), and revisions thereto as adopted by General Statutes of North Carolina 95-126 through 155.
- g. The contractor shall designate a responsible member of his organization as safety inspector, whose duties shall include accident prevention on the work project. The name of the safety inspector shall be made known to the designer at the time the work is started.
- h. In the event of emergency affecting the safety of life, the protection of work, or the safety of adjoining properties, the contractor is hereby authorized to act at his own discretion, without further authorization from anyone, to prevent such threatened injury or damage. Any compensation claimed by the contractor on account of such action shall be determined as provided for under Article 19(b).

## ARTICLE 12 - SEDIMENTATION POLLUTION CONTROL ACT OF 1973

- a. Any land-disturbing activity performed by the contractor(s) in connection with the project shall comply with all erosion control measures set forth in the contract documents and any additional measures which may be required in order to ensure that the project is in full compliance with the Sedimentation Pollution Control Act of 1973, as implemented by Title 15, North Carolina Administrative Code, Chapter 4, Sedimentation Control, Subchapters 4A, 4B and 4C, as amended (15 N.C.A.C. 4A, 4B and 4C).
- b. Upon receipt of notice that a land-disturbing activity is in violation of said act, the contractor(s) shall be responsible for ensuring that all steps or actions necessary to bring the project in compliance with said act are promptly taken.
- c. The contractor(s) shall be responsible for defending any legal actions instituted pursuant to N.C.G.S. 113A-64 against any party or persons described in this article.
- d. To the fullest extent permitted by law, the contractor(s) shall indemnify and hold harmless the owner, the designer and the agents, consultants and employees of the owner and designer, from and against all claims, damages, civil penalties, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from the performance of work or failure of performance of work, provided that any such claim, damage, civil penalty, loss or expense is attributable to a violation of the Sedimentation Pollution Control Act. Such obligation shall not be construed to negate, abridge or otherwise reduced any other right or obligation of indemnity which would otherwise exist as to any party or persons described in this article.

## ARTICLE 13 - INSPECTION OF THE WORK

- a. It is a condition of this contract that the work shall be subject to inspection during normal working hours by the designer, designated official representatives of the owner, and those persons required by state law to test special work for official approval. The contractor shall therefore provide safe access to the work at all times for such inspections.
- b. All instructions to the contractor will be made only by or through the designer or his designated project representative. Observations made by official representatives of the owner shall be conveyed to the designer for review and coordination prior to issuance to the contractor.
- c. Where special inspection or testing is required by virtue of any state laws, instructions of the designer, specifications or codes, the contractor shall give adequate notice to the designer of the time set for such inspection or test, if the inspection or test will be conducted by a party other than the designer. Such special tests or inspections will be made in the presence of the designer, or his authorized representative, and it shall be the contractor's responsibility to serve ample notice of such tests.
- d. All laboratory tests shall be paid by the owner unless provided otherwise in the contract documents except the general contractor shall pay for laboratory tests to establish design mix for concrete, and for additional tests to prove compliance with contract documents where materials have tested deficient except when the testing laboratory did not follow the appropriate ASTM testing procedures.
- e. Should any work be covered up or concealed prior to inspection and approval by the designer, such work shall be uncovered or exposed for inspection, if so requested by the



designer in writing. Inspection of the work will be made promptly upon notice from the contractor. All cost involved in uncovering, repairing, replacing, recovering and restoring to design condition, the work that has been covered or concealed will be paid by the contractor involved.

- f. If any other portion of the work has been covered which the designer has not specifically requested to observe prior to being covered, the designer may request to see such work and it shall be uncovered by the contractor. If such work be found in accordance with the contract documents, the cost of uncovering and replacement shall, by appropriate change order, be charged to the owner. If such work be found not in accordance with the contract documents, the contractor shall pay such costs unless it be found that this condition was caused by the owner or a separate contractor as provided in Article 15, in which event the owner or the separate contractor shall be responsible for the payment of such costs.

#### **ARTICLE 14 - CONSTRUCTION SUPERVISION AND SCHEDULE**

- a. Throughout the progress of the work, each contractor shall keep at the job site, a competent superintendent or supervisory staff satisfactory to the designer. The superintendent shall not be changed without the consent of the designer unless said superintendent ceases to be employed by the contractor or ceases to be competent. The superintendent shall have authority to act on behalf of the contractor, and instructions, directions or notices given to him shall be as binding as if given to the contractor. However, directions, instructions, and notices shall be confirmed in writing.
- b. The contractor shall examine and study the drawings and specifications and fully understand the project design, and shall provide constant and efficient supervision to the work. Should he discover any discrepancies of any sort in the drawings or specifications, he shall report them to the designer without delay. He will not be held responsible for discrepancies in the drawings and/or specifications, but shall be held responsible to report them should they become known to him.
- c. All contractors shall be required to cooperate and consult with each other during the construction of this project. Prior to installation of work, all contractors shall jointly prepare coordination drawings, showing locations of various ductworks, piping, motors, pumps, and other mechanical or electrical equipment, in relation to the structure, walls and ceilings. These drawings shall be submitted to the designer through the Project Expediter for information only. Each contractor shall lay out and execute his work to cause the least delay to other contractors. Each contractor shall be financially responsible for any damage to other contractor's work and for undue delay caused to other contractors on the project.
- d. The contractor is required to attend monthly job site progress conferences as called by the designer. The contractor shall be represented at these job progress conferences by both home office and project personnel. These representatives shall have authority to act on behalf of the contractor. These meetings shall be open to subcontractors, material suppliers and any others who can contribute toward maintaining required job progress. It shall be the principal purpose of these meetings, or conferences, to effect coordination, cooperation and assistance in every practical way toward the end of maintaining progress of the project on schedule and to complete the project within the specified contract time. Each contractor shall be prepared to assess progress of the work as required in his particular contract and to recommend remedial measures for correction of progress as may be appropriate. The designer or his authorized representative shall be the coordinator of the conferences and shall preside as chairman.

- e. The contractor(s) shall, if required by the Supplementary General Conditions, employ an engineer or a land surveyor licensed in the State of North Carolina to lay out the work and to establish a bench mark nearby in a location where same will not be disturbed and where direct instruments sights may be taken.
- f. The designer shall designate a Project Expediter on projects involving two or more prime contracts. The Project Expediter shall be designated in the Supplementary General Conditions. The Project Expediter shall have the following responsibilities.
  - 1. Prepare the project construction schedule and shall allow all prime contractors (multi-prime contract) and subcontractors (single-prime contract) performing general, plumbing, HVAC, and electrical work equal input into the preparation of the initial construction schedule.
  - 2. Maintain a project progress schedule for all contractors.
  - 3. Give adequate notice to all contractors to ensure efficient continuity of all phases of the work.
  - 4. Notify the designer of any changes in the project schedule.
  - 5. Recommend to the owner whether payment to a contractor shall be approved.
- g. It shall be the responsibility of the Project Expediter to cooperate with and obtain from several prime contractors and subcontractors on the job, their respective work activities and integrate these activities into a project construction schedule in form of a detailed bar chart or Critical Path Method (CPM), schedule. Each prime contractor shall provide work activities within fourteen (14) days of request by the Project Expediter. A “work activity”, for scheduling purposes, shall be any component or contractual requirement of the project requiring at least one (1) day, but not more than fourteen (14) days, to complete or fulfill. The project construction schedule shall graphically show all salient features of the work required to construct the project from start to finish and within the allotted time established in the contract. The time (in days) between the contractor’s early completion and contractual completion dates is part of the project total float time; and shall be used as such, unless amended by a change order. On a multi-prime project, each prime contractor shall review the proposed construction schedule and approve same in writing. The Project Expediter shall submit the proposed construction schedule to the designer for comments. The complete Project construction schedule shall be of the type set forth in the Supplementary General Condition or subparagraph (1) or (2) below, as appropriate:
  - 1. For a project with total contracts of \$1,000,000 or less, a bar chart schedule will satisfy the above requirement. The schedule shall indicate the estimated starting and completion dates for each major element of the work.
  - 2. For a project with total contracts over \$1,000,000, a Critical Path Method (CPM) schedule shall be utilized to control the planning and scheduling of the Work. The CPM schedule shall be the responsibility of the Project Expediter and shall be paid for by the Project Expediter.

**Bar Chart Schedule:** Where a bar chart schedule is required, it shall be time-scaled in weekly increments, shall indicate the estimated starting and completion dates for each major element of the work by trade and by area, level, or zone, and shall schedule dates for all salient features, including but not limited to the placing of orders for materials, submission of shop drawings and other Submittals for approval, approval of shop drawings by designers, the manufacture and delivery of material, the testing and the installation of materials, supplies and equipment, and all Work activities to be performed by the Contractor. The Contractor shall allow sufficient time in his schedule for all required inspections. Each Work activity will be assigned a time estimate by the Contractor. One day shall be the smallest time unit used.

**CPM Schedule:** Where a CPM schedule is required, it shall be in time-scaled precedence format using the Project Expediter's logic and time estimates. The CPM schedule shall be drawn or plotted with activities grouped or zoned by Work area or subcontract as opposed to a random (or scattered) format. The CPM schedule shall be time-scaled on a weekly basis and shall be drawn or plotted at a level of detail and logic which will schedule all salient features of the work to be performed by the Contractor. The Contractor shall allow sufficient time in his schedule for all required inspections. Each Work activity will be assigned a time estimate by the Contractor. One day shall be the smallest time unit used.

The CPM schedule will identify and describe each activity, state the duration of each activity, the calendar dates for the early and late start and the early and late finish of each activity, and clearly highlight all activities on the critical path. "Total float" and "free float" shall be indicated for all activities. Float time shall not be considered for the exclusive use or benefit of either the Owner or the Contractor, but must be allocated in the best interest of completing the Work within the Contract time. Extensions to the Contract time, when granted by Change Order, will be granted only when equitable time adjustment exceeds the Total Float in the activity or path of activities affected by the change. On contracts with a price over \$2,500,000, the CPM schedule shall also show what part of the Contract Price is attributable to each activity on the schedule, the sum of which for all activities shall equal the total Contract Price.

**Early Completion of Project:** The Contractor may attempt to complete the project prior to the Contract Completion Date. However, such planned early completion shall be for the Contractor's convenience only and shall not create any additional rights of the Contractor or obligations of the Owner under this Contract, nor shall it change the Time for Completion or the Contract Completion Date. The Contractor shall not be required to pay liquidated damages to the Owner because of its failure to complete by its planned earlier date. Likewise, the Owner shall not pay the Contractor any additional compensation for early completion nor will the Owner owe the Contractor any compensation should the Owner, its officers, employees, or agents cause the Contractor not to complete earlier than the date required by the Contract Documents.

- h. The proposed project construction schedule shall be presented to the designer no later than thirty (30) days after written notice to proceed. No application for payment will be processed until this schedule is accepted by the owner.
- i. The approved project construction schedule shall be distributed to all contractors and displayed at the job site by the Project Expediter.
- j. The several contractors shall be responsible for their work activities and shall notify the Project Expediter of any necessary changes or adjustments to their work. The Project Expediter shall maintain the project construction schedule, making monthly adjustments, updates, corrections, etc., that are necessary to finish the project within the Contract time, keeping all contractors and the designer fully informed. Copy of a bar chart schedule annotated to show the current progress shall be submitted by the Contractor(s) to the designer, along with monthly request for payment. For project requiring CPM schedule, the Contractor shall submit a monthly report of the status of all activities. The bar chart schedule or monthly status report shall show the actual Work completed to date in comparison with the original Work scheduled for all activities. If any activities of the work of several contractors are behind schedule, the contractor must indicate in writing, what measures will be taken to bring each such activity back on schedule and to ensure that the Contract Completion Date is not exceeded. A plan of action and recovery schedule shall be developed and submitted to the designer by the Project Expediter, when (1) the contractor's monthly report indicates delays, that are in the opinion of the designer or the owner, of sufficient magnitude that the contractor's ability to complete the work by the scheduled completion is brought into question; (2) the updated construction schedule is thirty (30) days behind the planned or baseline schedule and no legitimate time extensions are in process; and (3) the contractor desires to make changes in the logic (sequencing of work) or the planned duration of future activities of the CPM schedule which, in the opinion of the designer or the owner, are of a major nature. The plan of action, when required shall be submitted to the Owner for review within two (2) business days of the Contractor receiving the Owner's written demand. The recovery schedule, when required, shall be submitted to the Owner within five (5) calendar days of the Contractor's receiving the Owner's written demand. Failure to provide an updated construction schedule or a recovery schedule may be grounds for rejection of payment applications or withholding of funds as set forth in Article 33.
- k. The Project Expediter shall notify each contractor of such events or time frames that are critical to the progress of the job. Such notice shall be timely and reasonable. Should the progress be delayed due to the work of any of the several contractors, it shall be the duty of the Project Expediter to immediately notify the contractor(s) responsible for such delay, the designer, the State Construction Office and other prime contractors. The designer shall determine the contractor(s) who caused the delays and notify the bonding company of the responsible contractor(s) of the delays; and shall make a recommendation to the owner regarding further action.
- l. Designation as Project Expediter entails an additional project control responsibility and does not alter in any way the responsibility of the contractor so designated, nor the responsibility of the other contractors involved in the project.

## **ARTICLE 15 - SEPARATE CONTRACTS AND CONTRACTOR RELATIONSHIPS**

- a. Effective from January 1, 2002, Chapter 143, Article 8, was amended, to allow public contracts to be bid in single-prime, dual (single-prime and separate-prime), construction manager at risk, and alternative contracting method as approved by the State Building Commission. The owner reserves the right to prepare separate specifications, receive

separate bids, and award separate contracts for such other major items of work as may be in the best interest of the State. For the purposes of a single prime contract, refer to Article 1 – Definitions.

- b. All contractors shall cooperate with each other in the execution of their work, and shall plan their work in such manner as to avoid conflicting schedules or delay of the work. See Article 14, Construction Supervision.
- c. If any part of contractor's work depends upon the work of another contractor, defects which may affect that work shall be reported to the designer in order that prompt inspection may be made and the defects corrected. Commencement of work by a contractor where such condition exists will constitute acceptance of the other contractor's work as being satisfactory in all respects to receive the work commenced, except as to defects which may later develop. The designer shall be the judge as to the quality of work and shall settle all disputes on the matter between contractors.
- d. Any mechanical or electrical work such as sleeves, inserts, chases, openings, penetrations, etc., which is located in the work of the general contractor shall be built in by the general contractor. The respective mechanical and electrical contractors shall set all sleeves, inserts and other devices that are to be incorporated into the structure in cooperation and under the supervision of the general contractor. The responsibility for the exact location of such items shall be that of the mechanical and/or electrical contractor.
- e. The designer and the owner shall have access to the work whenever it is in preparation and progress during normal working hours. The contractor shall provide facilities for such access so the designer may perform his functions under the contract documents.
- f. Should a contractor cause damage to the work or property of another contractor, he shall be directly responsible, and upon notice, shall promptly settle the claim or otherwise resolve the dispute.

#### **ARTICLE 16 - SUBCONTRACTS AND SUBCONTRACTORS**

- a. Within thirty (30) days after award of the contract, the contractor shall submit to the designer and to the State Construction Office a list giving the names and addresses of subcontractors and equipment and material suppliers he proposes to use, together with the scope of their respective parts of the work. Should any subcontractor be disapproved by the designer, the designer shall submit his reasons for disapproval in writing to the State Construction Office for its consideration with a copy to the contractor. If the State Construction Office concurs with the designer's recommendation, the contractor shall submit a substitute for approval. The designer shall act promptly in the approval of subcontractors, and when approval of the list is given, no changes of subcontractors will be permitted except for cause or reason considered justifiable by the designer.
- b. The designer will furnish to any subcontractor, upon request, evidence regarding amounts of money paid to the contractor on account of the subcontractor's work.
- c. The contractor is and remains fully responsible for his own acts or omissions as well as those of any subcontractor or of any employee of either. The contractor agrees that no contractual relationship exists between the subcontractor and the owner in regard to the contract, and that the subcontractor acts on this work as an agent or employee of the contractor.
- d. The owner reserves the right to limit the amount of portions of work to be subcontracted as hereinafter specified.

## ARTICLE 17 - CONTRACTOR AND SUBCONTRACTOR RELATIONSHIPS

The contractor agrees that the terms of these contract documents shall apply equally to each subcontractor as to the contractor, and the contractor agrees to take such action as may be necessary to bind each subcontractor to these terms. The contractor further agrees to conform to the Code of Ethical Conduct as adopted by the Associated General Contractors of America, Inc., with respect to contractor-subcontractor relationships, and that payments to subcontractors shall be made in accordance with the provisions of G.S. 143-134.1 titled Interest on final payments due to prime contractors: payments to subcontractors.

- a. On all public construction contracts which are let by a board or governing body of the state government or any political subdivision thereof, except contracts let by the Department of Transportation pursuant to G.S. 136-28.1, the balance due prime contractors shall be paid in full within 45 days after respective prime contracts of the project have been accepted by the owner, certified by the architect, engineer or designer to be completed in accordance with terms of the plans and specifications, or occupied by the owner and used for the purpose for which the project was constructed, whichever occurs first. Provided, however, that whenever the architect or consulting engineer in charge of the project determines that delay in completion of the project in accordance with terms of the plans and specifications is the fault of the contractor, the project may be occupied and used for the purposes for which it was constructed without payment of any interest on amounts withheld past the 45day limit. No payment shall be delayed because of the failure of another prime contractor on such project to complete his contract. Should final payment to any prime contractor beyond the date such contracts have been certified to be completed by the designer or architect, accepted by the owner, or occupied by the owner and used for the purposes for which the project was constructed, be delayed by more than 45 days, said prime contractor shall be paid interest, beginning on the 46th day, at the rate of one percent (1%) per month or fraction thereof unless a lower rate is agreed upon on such unpaid balance as may be due. In addition to the above final payment provisions, periodic payments due a prime contractor during construction shall be paid in accordance with the payment provisions of the contract documents or said prime contractor shall be paid interest on any such unpaid amount at the rate stipulated above for delayed final payments. Such interest shall begin on the date the payment is due and continue until the date on which payment is made. Such due date may be established by the terms of the contract. Funds for payment of such interest on state-owned projects shall be obtained from the current budget of the owning department, institution or agency. Where a conditional acceptance of a contract exists, and where the owner is retaining a reasonable sum pending correction of such conditions, interest on such reasonable sum shall not apply.
- b. Within seven days of receipt by the prime contractor of each periodic or final payment, the prime contractor shall pay the subcontractor based on work completed or service provided under the subcontract. Should any periodic or final payment to the subcontractor be delayed by more than seven days after receipt of periodic or final payment by the prime contractor, the prime contractor shall pay the subcontractor interest, beginning on the eighth day, at the rate of one percent (1%) per month or fraction thereof on such unpaid balance as may be due.
- c. The percentage of retainage on payments made by the prime contractor to the subcontractor shall not exceed the percentage of retainage on payments made by the owner to the prime contractor. Any percentage of retainage on payments made by the

prime contractor to the subcontractor that exceeds the percentage of retainage on payments made by the owner to the prime contractor shall be subject to interest to be paid by the prime contractor to the subcontractor at the rate of one percent (1%) per month or fraction thereof.

- d. Nothing in this section shall prevent the prime contractor at the time of application and certification to the owner from withholding application and certification to the owner for payment to the subcontractor for unsatisfactory job progress; defective construction not remedied; disputed work; third-party claims filed or reasonable evidence that claim will be filed; failure of subcontractor to make timely payments for labor, equipment and materials; damage to prime contractor or another subcontractor; reasonable evidence that subcontract cannot be completed for the unpaid balance of the subcontract sum; or a reasonable amount for retainage not to exceed the initial percentage retained by owner.

#### **ARTICLE 18 - DESIGNER'S STATUS**

- a. The designer shall provide general administration of the performance of construction contracts, including liaison and necessary inspection of the work to ensure compliance with plans and specifications. He is the agent of the owner only for the purpose of constructing this work and to the extent stipulated in the contract documents. He has authority to stop work or to order work removed, or to order corrections of faulty work where such action may be necessary to assure successful completion of the work.
- b. The designer is the impartial interpreter of the contract documents, and, as such, he shall exercise his powers under the contract to enforce faithful performance by both the owner and the contractor, taking sides with neither.
- c. Should the designer cease to be employed on the work for any reason whatsoever, then the owner shall employ a competent replacement who shall assume the status of the former designer.
- d. The designer will make periodic inspections of the project at intervals appropriate to the stage of construction. He will inspect the progress, the quality and the quantity of the work.
- e. The designer and the owner shall have access to the work whenever it is in preparation and progress during normal working hours. The contractor shall provide facilities for such access so the designer may perform his functions under the contract documents.
- f. Based on the designer's inspections and evaluations of the project, the designer shall issue interpretations, directives and decisions as may be necessary to administer the project. His decisions relating to artistic effect and technical matters shall be final, provided such decisions are within the limitations of the contract.

#### **ARTICLE 19 - CHANGES IN THE WORK**

- a. The owner may have changes made in the work covered by the contract. These changes will not invalidate and will not relieve or release the contractor from any guarantee given by him pertinent to the contract provisions. These changes will not affect the validity of the guarantee bond and will not relieve the surety or sureties of said bond. All extra work shall be executed under conditions of the original contract.
- b. Except in an emergency endangering life or property, **NO CHANGE SHALL BE MADE BY THE CONTRACTOR EXCEPT UPON RECEIPT OF APPROVED CHANGE ORDER OR WRITTEN FIELD ORDER FROM THE DESIGNER,**

COUNTERSIGNED BY THE OWNER AND THE STATE CONSTRUCTION OFFICE AUTHORIZING SUCH CHANGE. NO CLAIM FOR ADJUSTMENTS OF THE CONTRACT PRICE SHALL BE VALID UNLESS THIS PROCEDURE IS FOLLOWED.

A FIELD ORDER, TRANSMITTED BY FAX OR HAND DELIVERED, MAY BE USED WHERE THE CHANGE INVOLVED IMPACTS THE CRITICAL PATH OF THE WORK. A FORMAL CHANGE ORDER SHALL BE ISSUED WITHIN THE TIME STATED ON THE FIELD ORDER.

In the event of emergency endangering life or property, the contractor may be directed to proceed on a time and material basis whereupon the contractor shall proceed and keep accurately on such form as may be required, a correct account of costs together with all proper invoices, payrolls and supporting data. Upon completion of the work the change order will be prepared as outlined under either Method "c(1)" or Method "c(2)" or both.

- c. In determining the values of changes, either additive or deductive, contractors are restricted to the use of the following methods:
  1. Where the extra work involved is covered by unit prices quoted in the proposal, the value of the change shall be computed by application of unit prices based on quantities, estimated or actual as agreed of the items involved, except in such cases where a quantity exceeds the estimated quantity allowance in the contract by one hundred percent (100%) or more. In such cases, either party may elect to proceed under subparagraph c2 herein. If neither party elects to proceed under c2, then unit prices shall apply.
  2. The contracting parties shall negotiate and agree upon the equitable value of the change prior to issuance of the change order, and the change order shall stipulate the corresponding lump sum adjustment to the contract price.
- d. Under Paragraph "b" and Methods "c(2)" above, the allowances for overhead and profit combined shall not exceed twenty percent (20%) of **net cost** except where the change involves a subcontractor, allowance shall not exceed fifteen percent (15%) for the subcontractor, and ten percent (10%) for the prime contractor. Under Method "c(1)", no additional allowances shall be made for overhead and profit. In the case of deductible change orders, under Method "c(2)" and Paragraph (b) above, the contractor shall include no less than five percent (5%) profit, but no allowances for overhead.
- e. The term "net cost" as used herein shall mean the difference between all proper cost additions and deductions. The "cost" as used herein shall be limited to the following:
  1. The actual costs of materials and supplies incorporated or consumed as part of the project;
  2. The actual costs of labor expended on the project site;
  3. The actual costs of labor burden, limited to the costs of social security (FICA) and Medicare/Medicaid taxes; unemployment insurance costs; health/dental/vision insurance premiums; paid employee leave for holidays, vacation, sick leave, and/or petty leave, not to exceed a total of 30 days per year; retirement contributions; worker's compensation insurance premiums; and the costs of general liability insurance when premiums are computed based on payroll amounts; the total of which shall not exceed forty percent (40%) of the actual costs of labor;



4. The actual costs of rental for tools, excluding hand tools; equipment; machinery; and temporary facilities required for the project;
5. The actual costs of premiums for bonds, insurance, permit fees, and sales or use taxes related to the project.

Overtime and extra pay for holidays and weekends may be a cost item only to the extent approved by the owner.

- f. Should concealed conditions be encountered in the performance of the work below grade, or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the contract documents, the contract sum and time for completion may be equitably adjusted by change order upon claim by either party made within thirty (30) days after the condition has been identified. The cost of such change shall be arrived at by one of the foregoing methods.

**ALL CHANGE ORDERS SHALL BE SUPPORTED BY A BREAKDOWN SHOWING METHOD OF ARRIVING AT NET COST AS DEFINED ABOVE.**

- g. In all change orders, the procedure will be for the designer to request proposals for the change order work in writing. The contractor will provide such proposal and supporting data in suitable format. The designer shall verify correctness. Within fourteen (14) days after receipt of the contractor's proposal, the designer shall prepare the change order and forward to the contractor for his signature or otherwise respond, in writing, to the contractor's proposal. Within seven (7) days after receipt of the change order executed by the contractor, the designer shall, certify the change order by his signature, and forward the change order and all supporting data to the owner for the owner's signature. The owner shall execute the change order and forward to the State Construction Office for final approval, within seven (7) days of receipt. The State Construction Office shall act on the change order within seven (7) days. Upon approval by the State Construction Office, one copy remains with the State Construction Office, and the remaining copies are sent to the designer for distribution to the owner(s), contractor(s) and the surety. In case of emergency or extenuating circumstances, approval of changes may be obtained verbally by telephone or field orders approved by all parties, then shall be substantiated in writing as outlined under normal procedure.
- h. At the time of signing a change order, the contractor shall be required to certify as follows:  
  
"I certify that my bonding company will be notified forthwith that my contract has been changed by the amount of this change order, and that a copy of the approved change order will be mailed upon receipt by me to my surety."
- i. A change order, when issued, shall be full compensation, or credit, for the work included, omitted or substituted. It shall show on its face the adjustment in time for completion of the project as a result of the change in the work.
- j. If, during the progress of the work, the owner requests a change order and the contractor's terms are unacceptable, the owner, with the approval of the State Construction Office, may require the contractor to perform such work on a time and material basis in accordance with paragraph "b" above. Without prejudice, nothing in this paragraph shall preclude the owner from performing or to have performed that portion of the work requested in the change order.

## ARTICLE 20 - CLAIMS FOR EXTRA COST

- a. Should the contractor consider that as a result of any instructions given in any form by the designer, he is entitled to extra cost above that stated in the contract, he shall give written notice thereof to the designer within seven (7) days without delay, and shall not proceed with the work affected until further advised, except in emergency involving the safety of life or property, which condition is covered in Article 19(b) and Article 11(h). No claims for extra compensation will be considered unless the claim is so made. The designer shall render a written decision within seven (7) days of receipt of claim.
- b. **THE CONTRACTOR SHALL NOT ACT ON INSTRUCTIONS RECEIVED BY HIM FROM PERSONS OTHER THAN THE DESIGNER, AND ANY CLAIMS FOR EXTRA COMPENSATION OR EXTENSION OF TIME ON ACCOUNT OF SUCH INSTRUCTION WILL NOT BE HONORED.** The designer will not be responsible for misunderstandings claimed by the contractor of verbal instructions which have not been confirmed in writing, and in no case shall instructions be interpreted as permitting a departure from the contract documents unless such instruction is confirmed in writing and supported by a properly authorized change order.
- c. Should a claim for extra compensation by the contractor be denied by the designer or owner, and cannot be resolved by a representative of the State Construction Office, the contractor may request a mediation in connection with GS 143-128(f1) in the dispute resolution rules adopted by the State Building Commission. If the contractor is unable to resolve its claim as a result of mediation, the contractor may pursue the claim in accordance with the provisions of G.S. 143-135.3 and the following:
  1. A contractor who has not completed a contract with a board for construction or repair work and who has not received the amount he claims is due under the contract may submit a verified written claim to the director of the State Construction Office of the Department of Administration for the amount the contractor claims is due. The director may deny, allow or compromise the claim, in whole or in part. A claim under this subsection is not a contested case under Chapter 150B of the General Statutes.
  2. (a) A contractor who has completed a contract with a board for construction or repair work and who has not received the amount he claims is due under the contract may submit a verified written claim to the director of the State Construction Office of the Department of Administration for the amount the contractor claims is due. The claim shall be submitted within sixty (60) days after the contractor receives a final statement of the board's disposition of his claim and shall state the factual basis for the claim.
    - (b) The director shall investigate a submitted claim within ninety (90) days of receiving the claim, or within any longer time period upon which the director and the contractor agree. The contractor may appear before the director, either in person or through counsel, to present facts and arguments in support of his claim. The director may allow, deny or compromise the claim, in whole or in part. The director shall give the contractor a written statement of the director's decision on the contractor's claim.
    - (c) A contractor who is dissatisfied with the director's decision on a claim submitted under this subsection may commence a contested case on the claim under Chapter 150B of the General Statutes. The contested case shall be commenced within sixty (60) days of receiving the director's written statement of the decision.

- (d) As to any portion of a claim that is denied by the director, the contractor may, in lieu of the procedures set forth in the preceding subsection of this section, within six (6) months of receipt of the director's final decision, institute a civil action for the sum he claims to be entitled to under the contract by filing a verified complaint and the issuance of a summons in the Superior Court of Wake County or in the superior court of any county where the work under the contract was performed. The procedure shall be the same as in all civil actions except that all issues shall be tried by the judge, without a jury.

#### **ARTICLE 21 - MINOR CHANGES IN THE WORK**

The designer will have the authority to order minor changes in the work not involving an adjustment in the contract sum or time for completion, and not inconsistent with the intent of the contract documents. Such changes shall be effected by written order, copied to the State Construction Office, and shall be binding on the owner and the contractor.

#### **ARTICLE 22 - UNCORRECTED FAULTY WORK**

Should the correction of faulty or damaged work be considered inadvisable or inexpedient by the owner and the designer, the owner shall be reimbursed by the contractor. A change order will be issued to reflect a reduction in the contract sum.

#### **ARTICLE 23 - TIME OF COMPLETION, DELAYS, EXTENSION OF TIME**

- a. The time of completion is stated in the Supplementary General Conditions and in the Form of Construction Contract. The Project Expediter, upon notice of award of contract, shall prepare a construction schedule to complete the project within the time of completion as required by Article 14.
- b. The contractor(s) shall commence work to be performed under this agreement on a date to be specified in a written Notice to Proceed from the designer and shall fully complete all work hereunder within the time of completion stated. For each day in excess of the above number of days, the contractor(s) shall pay the owner the sum stated as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the owner by reason of failure of said contractor(s) to complete the work within the time specified, such time being in the essence of this contract and a material consideration thereof.
- c. The designer shall be the judge as to the division of responsibility between the contractor(s), based on the construction schedule, weekly reports and job records, and shall apportion the amount of liquidated damages to be paid by each of them, according to delay caused by any or all of them.
- d. If the contractor is delayed at any time in the progress of his work by any act or negligence of the owner or the designer, or by any employee of either; by any separate contractor employed by the owner; by changes ordered in the work; by labor disputes at the project site; by abnormal weather conditions not reasonably anticipated for the locality where the work is performed; by unavoidable casualties; by any causes beyond the contractor's control; or by any other causes which the designer and owner determine may justify the delay, then the contract time may be extended by change order for the time which the designer and owner may determine is reasonable.

Time extensions will not be granted for rain, wind, snow or other natural phenomena of **normal intensity** for the locality where work is performed. For purpose of determining extent of delay attributable to unusual weather phenomena, a determination shall be

made by comparing the weather for the contract period involved with the average of the preceding five (5) year climatic range during the same time interval based on the National Oceanic and Atmospheric Administration National Weather Service statistics for the locality where work is performed and on daily weather logs kept on the job site by the contractor reflecting the effect of the weather on progress of the work and initialed by the designer's representative. Time extensions for weather delays do not entitle the contractor to "extended overhead" recovery.

- e. Request for extension of time shall be made in writing within twenty (20) days following cause of delay. In case of continuing cause for delay, the Contractor shall notify the Designer of the delay within 20 days of the beginning of the delay and only one claim is necessary.
- f. The contractor shall notify his surety in writing of extension of time granted.
- g. No claim shall be allowed on account of failure of the designer to furnish drawings or instructions until twenty (20) days after demand for such drawings and/or instructions. See Article 5c.

#### **ARTICLE 24 - PARTIAL UTILIZATION/BENEFICIAL OCCUPANCY**

- a. The owner may desire to occupy or utilize all or a portion of the project when the work is substantially complete.
- b. Prior to the final payment, the owner, with the approval of the State Construction Office, may request the contractor(s) in writing, through the designer if applicable, to permit him to use a specified part of the project which he believes he may use without significant interference with construction of the other parts of the project. If the contractor(s) agree, the designer will schedule a beneficial occupancy inspection, with the approval of the State Construction Office, after which the designer may issue a certificate of substantial completion. The certificate shall include the following documentation:
  - 1. Date of substantial completion.
  - 2. A tentative list of items to be completed or corrected before final payment.
  - 3. Establishing responsibility between contractor and owner for maintenance, heat, utilities and insurance.
  - 4. Establishing the date for guarantees and warranties under terms of the contract.
  - 5. Consent of surety.
  - 6. Endorsement from insurance company permitting occupancy.
- c. The owner shall have the right to exclude the contractor from any part of the project which the designer has so certified to be substantially complete, but the owner will allow the contractor reasonable access to complete or correct work to bring it into compliance with the contract.
- d. Occupancy by the owner under this article will in no way relieve the contractor from his contractual requirement to complete the project within the specified time. The contractor will not be relieved of liquidated damages because of beneficial occupancy. The designer may prorate liquidated damages based on the percentage of project occupied.

## **ARTICLE 25 - FINAL INSPECTION, ACCEPTANCE, AND PROJECT CLOSEOUT**

- a. Upon notification from the contractor(s) that the project is complete and ready for inspection, the designer shall make a preliminary final inspection to verify that the project is complete and ready for final inspection. Prior to final inspection, the contractor(s) shall complete all items requiring corrective measures noted at the preliminary inspection. The designer shall schedule a final inspection at a time and date acceptable to the owner, contractor(s) and State Construction Office.
- b. When contractors finish their work prior to completion by other contractors, these contracts shall be closed out through the final inspection, acceptance and final payment process on recommendation of the designer and approval of the State Construction Office.
- c. At the final inspection, the designer shall, if job conditions warrant, record a list of items that are found to be incomplete or not in accordance with the contract documents. At the conclusion of the final inspection, the designer and State Construction Office representative shall make the following determinations:
  1. That the project is completed and accepted.
  2. That the project is accepted subject to the list of discrepancies (punch list). All punch list items must be completed within thirty (30) days of acceptance or the owner may invoke Article 28, Owner's Right to Do Work.
  3. That the project is not complete and another date for a final inspection will be established.
- d. Within fourteen (14) days of acceptance per Paragraph c1 or within fourteen (14) days after completion of punch list per Paragraph c2 above, the designer shall certify the work and issue applicable certificate(s) of compliance.
- e. Any discrepancies listed or discovered after the date of final inspection and acceptance under Paragraphs c1 or c2 above shall be handled in accordance with Article 42.
- f. The date of acceptance will establish the following:
  1. The beginning of guarantees and warranties period.
  2. The date on which the contractor's insurance coverage for public liability, property damage and builder's risk may be terminated.
  3. That no liquidated damages (if applicable) shall be assessed after this date.
  4. The termination date of utility cost to the contractor.

## **ARTICLE 26 - CORRECTION OF WORK BEFORE FINAL PAYMENT**

- a. Any work, materials, fabricated items or other parts of the work which have been condemned or declared not in accordance with the contract by the designer shall be promptly removed from the work site by the contractor, and shall be immediately replaced by new work in accordance with the contract at no additional cost to the owner. Work or property of other contractors or the owner, damaged or destroyed by virtue of such faulty work, shall be made good at the expense of the contractor whose work is faulty.

- b. Correction of condemned work described above shall commence within twenty-four (24) hours after receipt of notice from the designer, and shall make satisfactory progress until completed.
- c. Should the contractor fail to proceed with the required corrections, then the owner may complete the work in accordance with the provisions of Article 28.

#### **ARTICLE 27 - CORRECTION OF WORK AFTER FINAL PAYMENT**

See Article 35, Performance Bond and Payment Bond, and Article 42, Guarantee. Neither the final certificate, final payment, occupancy of the premises by the owner, nor any provision of the contract, nor any other act or instrument of the owner, nor the designer, shall relieve the contractor from responsibility for negligence, or faulty material or workmanship, or failure to comply with the drawings and specifications. He shall correct or make good any defects due thereto and repair any damage resulting therefrom, which may appear during the guarantee period following final acceptance of the work except as stated otherwise under Article 42, Guarantee. The owner will report any defects as they may appear to the contractor and establish a time limit for completion of corrections by the contractor. The owner will be the judge as to the responsibility for correction of defects.

#### **ARTICLE 28 - OWNER'S RIGHT TO DO WORK**

If, during the progress of the work or during the period of guarantee, the contractor fails to prosecute the work properly or to perform any provision of the contract, the owner, after      fifteen (15) days' written notice sent by certified mail, return receipt requested, to the contractor from the designer, may perform or have performed that portion of the work. The cost of the work may be deducted from any amounts due or to become due to the contractor, such action and cost of same having been first approved by the designer. Should the cost of such action of the owner exceed the amount due or to become due the contractor, then the contractor or his surety, or both, shall be liable for and shall pay to the owner the amount of said excess.

#### **ARTICLE 29 - ANNULMENT OF CONTRACT**

If the contractor fails to begin the work under the contract within the time specified, or the progress of the work is not maintained on schedule, or the work is not completed within the time above specified, or fails to perform the work with sufficient workmen and equipment or with sufficient materials to ensure the prompt completion of said work, or shall perform the work unsuitably or shall discontinue the prosecution of the work, or if the contractor shall become insolvent or be declared bankrupt or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against him unsatisfied for a period of forty-eight (48) hours, or shall make an assignment for the benefit of creditors, or for any other cause whatsoever shall not carry on the work in an acceptable manner, the owner may give notice in writing, sent by certified mail, return receipt requested, to the contractor and his surety of such delay, neglect or default, specifying the same, and if the contractor within a period of fifteen (15) days after such notice shall not proceed in accordance therewith, then the owner shall, declare this contract in default, and, thereupon, the surety shall promptly take over the work and complete the performance of this contract in the manner and within the time frame specified. In the event the surety shall fail to take over the work to be done under this contract within fifteen (15) days after being so notified and notify the owner in writing, sent by certified mail, return receipt requested, that he is taking the same over and stating that he will diligently pursue and complete the same, the owner shall have full power and authority, without violating the contract, to take the prosecution of the work out of the hands of said contractor, to appropriate or use any or all contract materials and equipment on the grounds

as may be suitable and acceptable and may enter into an agreement, either by public letting or negotiation, for the completion of said contract according to the terms and provisions thereof or use such other methods as in his opinion shall be required for the completion of said contract in an acceptable manner. All costs and charges incurred by the owner, together with the costs of completing the work under contract, shall be deducted from any monies due or which may become due said contractor and surety. In case the expense so incurred by the owner shall be less than the sum which would have been payable under the contract, if it had been completed by said contractor, then the said contractor and surety shall be entitled to receive the difference, but in case such expense shall exceed the sum which would have been payable under the contract, then the contractor and the surety shall be liable and shall pay to the owner the amount of said excess.

#### **ARTICLE 30 - CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE THE CONTRACT**

- a. Should the work be stopped by order of a court having jurisdiction, or by order of any other public authority for a period of three months, due to cause beyond the fault or control of the contractor, or if the owner should fail or refuse to make payment on account of a certificate issued by the designer within thirty (30) days after receipt of same, then the contractor, after fifteen (15) days' written notice sent by certified mail, return receipt requested, to the owner and the designer, may suspend operations on the work or terminate the contract.
- b. The owner shall be liable to the contractor for the cost of all materials delivered and work performed on this contract plus 20 percent overhead and profit and shall make such payment. The designer shall be the judge as to the correctness of such payment.

#### **ARTICLE 31 - REQUEST FOR PAYMENT**

- a. Not later than the fifth day of the month, the contractor shall submit to the designer a request for payment for work done during the previous month. The request shall be in the form agreed upon between the contractor and the designer, but shall show substantially the value of work done and materials delivered to the site during the period since the last payment, and shall sum up the financial status of the contract with the following information:
  1. Total of contract including change orders.
  2. Value of work completed to date.
  3. Less five percent (5%) retainage, provided however, that after fifty percent (50%) of the contractor's work has been satisfactorily completed on schedule, with approval of the owner and the State Construction Office and written consent of the surety, further requirements for retainage will be waived only so long as work continues to be completed satisfactorily and on schedule.
  4. Less previous payments.
  5. Current amount due.
- b. The contractor, upon request of the designer, shall substantiate the request with invoices of vouchers or payrolls or other evidence.
- c. Prior to submitting the first request, the contractor shall prepare for the designer a schedule showing a breakdown of the contract price into values of the various parts of

the work, so arranged as to facilitate payments to subcontractors in accordance with Article 17, Contractor and Subcontractor Relationships. The contractor(s) shall list the value of each subcontractor and supplier, identifying each minority business subcontractor and supplier as listed in Affidavit C, if applicable.

- d. When payment is made on account of stored materials and equipment, such materials must be stored on the owner's property, and the requests for payments shall be accompanied by invoices or bills of sale or other evidence to establish the owner's title to such materials and equipment. Responsibility for such stored materials and equipment shall remain with the contractor regardless of ownership title. Such stored materials and equipment shall not be removed from the owner's property. Should the space for storage on-site be limited, the contractor, at his option, shall be permitted to store such materials and/or equipment in a suitable space off-site. Should the contractor desire to include any such materials or equipment in his application for payment, they must be stored in the name of the owner in a commercial warehouse approved by the designer and the State Construction Office and located as close to the site as possible. The warehouse selected must be approved by the contractor's bonding and insurance companies; the material to be paid for shall be assigned to the owner and shall be inspected by the designer. Upon approval by the designer of the storage facilities and materials and equipment, payment therefore will be certified. Responsibility for such stored materials and equipment shall remain with the contractor. Such stored materials and equipment shall not be moved except for transportation to the project site. Under certain conditions, the designer may approve storage of materials at the point of manufacture, which conditions shall be approved by the designer, the owner and the State Construction Office prior to approval for the storage and shall include an agreement by the storing party which unconditionally gives the State absolute right to possession of the materials at anytime. Bond, security and insurance protection shall continue to be the responsibility of the contractor(s).
- e. In the event of beneficial occupancy, retainage of funds due the contractor(s) may be reduced with the approval of the State Construction Office to an equitable amount to cover the list of items to be completed or corrected. Retainage may not be reduced to less than two and one-half (2 1/2) times the estimated value of the work to be completed or corrected. Reduction of retainage must be with the consent and approval of the contractor's bonding company.

## **ARTICLE 32 - CERTIFICATES OF PAYMENT AND FINAL PAYMENT**

- a. Within five (5) days from receipt of request for payment from the contractor, the designer shall issue and forward to the owner a certificate for payment. This certificate shall indicate the amount requested or as approved by the designer. If the certificate is not approved by the designer, he shall state in writing to the contractor and the owner his reasons for withholding payment.
- b. No certificate issued or payment made shall constitute an acceptance of the work or any part thereof. The making and acceptance of final payment shall constitute a waiver of all claims by the owner except:
  - 1. Claims arising from unsettled liens or claims against the contractor.
  - 2. Faulty work or materials appearing after final payment.
  - 3. Failure of the contractor to perform the work in accordance with drawings and specifications, such failure appearing after payment.
  - 4. As conditioned in the performance bond and payment bond.



- c. The making and acceptance of final payment shall constitute a waiver of all claims by the contractor except those claims previously made and remaining unsettled (Article 20(c)).
- d. Prior to submitting request for final payment to the designer for approval, the contractor shall fully comply with all requirements specified in the "project closeout" section of the specifications. These requirements include but not limited to the following:
  - 1. Submittal of Product and Operating Manuals, Warranties and Bonds, Guarantees, Maintenance Agreements, As-Built Drawings, Certificates of Inspection or Approval from agencies having jurisdiction. (The designer must approve the Manuals prior to delivery to the owner).
  - 2. Transfer of Required attic stock material and all keys in an organized manner.
  - 3. Record of Owner's training.
  - 4. Resolution of any final inspection discrepancies.
- e. The contractor shall forward to the designer, the final application for payment along with the following documents:
  - 1. List of minority business subcontractors and material suppliers showing breakdown of contracts amount.
  - 2. Affidavit of Release of Liens.
  - 3. Affidavit of contractors of payment to material suppliers and subcontractors. (See Article 36).
  - 4. Consent of Surety to Final Payment.
  - 5. Certificates of state agencies required by state law.
- f. The designer will not authorize final payment until the work under contract has been certified by designer, certificates of compliance issued, and the contractor has complied with the closeout requirements. The designer shall forward the contractor's final application for payment to the owner along with respective certificate(s) of compliance required by law.

### **ARTICLE 33 - PAYMENTS WITHHELD**

- a. The designer with the approval of the State Construction Office may withhold payment for the following reasons:
  - 1. Faulty work not corrected.
  - 2. The unpaid balance on the contract is insufficient to complete the work in the judgment of the designer.
  - 3. To provide for sufficient contract balance to cover liquidated damages that will be assessed.

- b. The secretary of the Department of Administration may authorize the withholding of payment for the following reasons:
  - 1. Claims filed against the contractor or evidence that a claim will be filed.
  - 2. Evidence that subcontractors have not been paid.
- c. When grounds for withholding payments have been removed, payment will be released. Delay of payment due the contractor without cause will make owner liable for payment of interest to the contractor as provided in G.S. 143-134.1.

**ARTICLE 34 - MINIMUM INSURANCE REQUIREMENTS**

The work under this contract shall not commence until the contractor has obtained all required insurance and verifying certificates of insurance have been approved in writing by the owner. These certificates shall contain a provision that coverages afforded under the policies will not be cancelled, reduced in amount or coverages eliminated until at least thirty (30) days after mailing written notice, by certified mail, return receipt requested, to the insured and the owner of such alteration or cancellation.

**a. Worker's Compensation and Employer's Liability**

The contractor shall provide and maintain, during the life of the contract, workmen's compensation insurance, as required by law, as well as employer's liability coverage with minimum limits of \$100,000.

**b. Public Liability and Property Damage**

The contractor shall provide and maintain, during the life of the contract, comprehensive general liability insurance, including coverage for premises operations, independent contractors, completed operations, products and contractual exposures, as shall protect such contractors from claims arising out of any bodily injury, including accidental death, as well as from claims for property damages which may arise from operations under this contract, whether such operations be by the contractor or by any subcontractor, or by anyone directly or indirectly employed by either of them and the minimum limits of such insurance shall be as follows:

Bodily Injury:	\$500,000 per occurrence
Property Damage:	\$100,000 per occurrence / \$300,000 aggregate

In lieu of limits listed above, a \$500,000 combined single limit shall satisfy both conditions.

Such coverage for completed operations must be maintained for at least two (2) years following final acceptance of the work performed under the contract.

**c. Property Insurance (Builder's Risk/Installation Floater)**

The contractor shall purchase and maintain property insurance during the life of this contract, upon the entire work at the site to the full insurable value thereof. This insurance shall include the interests of the owner, the contractor, the subcontractors and subsubcontractors in the work and shall insure against the perils of fire, extended coverage, and vandalism and malicious mischief. If the owner is damaged by failure of the contractor to purchase or maintain such insurance, then the contractor shall bear all reasonable costs properly attributable thereto; the contractor shall effect and maintain

similar property insurance on portions of the work stored off the site when request for payment per articles so includes such portions.

d. **Deductible**

Any deductible, if applicable to loss covered by insurance provided, is to be borne by the contractor.

e. **Other Insurance**

The contractor shall obtain such additional insurance as may be required by the owner or by the General Statutes of North Carolina including motor vehicle insurance, in amounts not less than the statutory limits.

f. **Proof of Carriage**

The contractor shall furnish the owner with satisfactory proof of carriage of the insurance required before written approval is granted by the owner.

### **ARTICLE 35 - PERFORMANCE BOND AND PAYMENT BOND**

- a. Each contractor shall furnish a performance bond and payment bond executed by a surety company authorized to do business in North Carolina. The bonds shall be in the full contract amount. Bonds shall be executed in the form bound with these specifications (Section 307 and Section 308).
- b. All bonds shall be countersigned by an authorized agent of the bonding company who is licensed to do business in North Carolina.

### **ARTICLE 36 - CONTRACTOR'S AFFIDAVIT**

The final payment of retained amount due the contractor on account of the contract shall not become due until the contractor has furnished to the owner through the designer an affidavit signed, sworn and notarized to the effect that all payments for materials, services or subcontracted work in connection with his contract have been satisfied, and that no claims or liens exist against the contractor in connection with this contract. In the event that the contractor cannot obtain similar affidavits from subcontractors to protect the contractor and the owner from possible liens or claims against the subcontractor, the contractor shall state in his affidavit that no claims or liens exist against any subcontractor to the best of his (the contractor's) knowledge, and if any appear afterward, the contractor shall save the owner harmless.

### **ARTICLE 37 - ASSIGNMENTS**

The contractor shall not assign any portion of this contract nor subcontract in its entirety. Except as may be required under terms of the performance bond or payment bond, no funds or sums of money due or become due the contractor under the contract may be assigned.

## **ARTICLE 38 - USE OF PREMISES**

- a. The contractor(s) shall confine his apparatus, the storage of materials and the operations of his workmen to limits indicated by law, ordinances, permits or directions of the designer and shall not exceed those established limits in his operations.
- b. The contractor(s) shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.
- c. The contractor(s) shall enforce the designer's instructions regarding signs, advertisements, fires and smoking.
- d. No firearms, any type of alcoholic beverages, or drugs (other than those prescribed by a physician) will be permitted at the job site.

## **ARTICLE 39 - CUTTING, PATCHING AND DIGGING**

- a. The contractor shall do all cutting, fitting or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of other contractors shown upon or reasonably implied by the drawings and specifications for the completed structure, as the designer may direct.
- b. Any cost brought about by defective or ill-timed work shall be borne by the party responsible therefor.
- c. No contractor shall endanger any work of another contractor by cutting, digging or other means. No contractor shall cut or alter the work of any other contractor without the consent of the designer and the affected contractor(s).

## **ARTICLE 40 - UTILITIES, STRUCTURES, SIGNS**

- a. The Project Expediter shall provide necessary and adequate facilities for water, electricity, gas, oil, sewer, and other utility services, which may be necessary and required for completion of the project. Any permanent meters installed shall be listed in the Project Expediter's name until his work is fully accepted by the owner. As stipulated in the Supplementary General Conditions, the Owner may: (1) pay utilities cost directly, (2) the Project Expediter to pay all utilities cost, (3) or reimburse the Project Expediter for the actual cost of utilities. The Owner or Project Expediter, as applicable, may recover actual costs of metered utilities from the responsible party should delays occur in project completion.
- b. Meters shall be relisted in the owner's name on the day following completion and acceptance of the Project Expediter's work, and the owner shall pay for services used after that date.
- c. The owner shall be reimbursed for all metered utility charges after the meter is relisted in the owner's name and prior to completion and acceptance of the work of **all** contractors. Reimbursement shall be made by the contractor whose work has not been completed and accepted. If the work of two or more contractors has not been completed and accepted, reimbursement to the owner shall be paid by the contractors involved on the basis of assessments by the designer.

- d. Prior to the operation of permanent systems, the Project Expediter will provide temporary power, lighting, water, and heat to maintain space temperature above freezing, as required for construction operations.
- e. All contractors shall have the permanent building systems in sufficient readiness for furnishing temporary climatic control at the time a building is enclosed and secured. The HVAC systems shall maintain climatic control throughout the enclosed portion of the building sufficient to allow completion of the interior finishes of the building. A building shall be considered enclosed and secured when windows, doorways (exterior, mechanical, and electrical equipment rooms), and hardware are installed; and other openings have protection which will provide reasonable climatic control. The appropriate time to start the mechanical systems and climatic condition shall be jointly determined by the contractor(s) and the designer. Use of the equipment in this manner shall in no way affect the warranty requirements of the contractor(s).
- f. The electrical contractor shall have the building's permanent power wiring distribution system in sufficient readiness to provide power as required by the HVAC contractor for temporary climatic control.
- g. The electrical contractor shall have the building's permanent lighting system ready at the time the general contractor begins interior painting and shall provide adequate lighting in those areas where interior painting and finishing is being performed.
- h. Each prime contractor shall be responsible for his permanently fixed service facilities and systems in use during progress of the work. The following procedures shall be strictly adhered to:
  - 1. Prior to acceptance of work by the owner, each contractor shall remove and replace any parts of the permanent building systems damaged through use during construction.
  - 2. Temporary filters shall be installed in each of the heating and air conditioning units and at each return grille during construction. New filters shall be installed in each unit prior to the owner's acceptance of the work.
  - 3. Extra effort shall be maintained to keep the building and the site adjacent to the building clean and under no circumstances shall air systems be operated if finishing and site work operations are creating dust in excess of what would be considered normal if the building were occupied.
  - 4. It shall be understood that any warranty on equipment presented to the owner shall extend from the day of final acceptance by the owner. The cost of warranting the equipment during operation in the finishing stages of construction shall be borne by the contractor whose system is utilized.
  - 5. The electrical contractor shall have all lamps in proper working condition at the time of final project acceptance.
- i. The Project Expediter shall provide, if required and where directed, a shed for toilet facilities and shall furnish and install in this shed all water closets required for a complete and adequate sanitary arrangement. These facilities will be available to other contractors on the job and shall be kept in a neat and sanitary condition at all times. Chemical toilets are acceptable.

- j. The Project Expediter shall, if required by the Supplementary General Conditions and where directed, erect a temporary field office, complete with lights, telephone, heat and air conditioning. A portion of this office shall be partitioned off, of sufficient size, for the use of a resident inspector, should the designer so direct.
- k. On multi-story construction projects, the Project Expediter shall provide temporary elevators, lifts, or other special equipment for the general use of all contractors. The cost for such elevators, lifts or other special equipment and the operation thereof shall be included in the Project Expediter's bid.
- l. The Project Expediter will erect one sign on the project if required. The sign shall be of sound construction, and shall be neatly lettered with black letters on white background. The sign shall bear the name of the project, and the names of prime contractors on the project, and the name of the designer and consultants. Directional signs may be erected on the owner's property subject to approval of the owner with respect to size, style and location of such directional signs. Such signs may bear the name of the contractor and a directional symbol. No other signs will be permitted except by permission of the owner.

#### **ARTICLE 41 - CLEANING UP**

- a. The contractors shall keep the building and surrounding area reasonably free from rubbish at all times, and shall remove debris from the site on a timely basis or when directed to do so by the designer or Project Expediter. The Project Expediter shall provide an on site refuse container(s) for the use of all contractors. Each contractor shall remove their rubbish and debris from the building on a daily basis. The Project Expediter shall broom clean the building as required to minimize dust and dirt accumulation.
- b. The Project Expediter shall provide and maintain suitable all-weather access to the building.
- c. Before final inspection and acceptance of the building, each contractor shall clean his portion of the work, including glass, hardware, fixtures, masonry, tile and marble (using no acid), clean and wax all floors as specified, and completely prepare the building for use by the owner, with no cleaning required by the owner.

#### **ARTICLE 42 - GUARANTEE**

- a. The contractor shall unconditionally guarantee materials and workmanship against patent defects arising from faulty materials, faulty workmanship or negligence for a period of twelve (12) months following the date of final acceptance of the work or beneficial occupancy and shall replace such defective materials or workmanship without cost to the owner.
- b. Where items of equipment or material carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material. The contractor shall replace such defective equipment or materials, without cost to the owner, within the manufacturer's warranty period.
- c. Additionally, the owner may bring an action for latent defects caused by the negligence of the contractor which is hidden or not readily apparent to the owner at the time of beneficial occupancy or final acceptance, whichever occurred first, in accordance with applicable law.

- d. Guarantees for roof, equipment, materials, and supplies shall be stipulated in the specifications sections governing such roof, equipment, materials, or supplies.

#### ARTICLE 43 - CODES AND STANDARDS

Wherever reference is given to codes, standard specifications or other data published by regulating agencies including, but not limited to, national electrical codes, North Carolina state building codes, federal specifications, ASTM specifications, various institute specifications, etc., it shall be understood that such reference is to the latest edition including addenda published prior to the date of the contract documents.

#### ARTICLE 44 - INDEMNIFICATION

To the fullest extent permitted by law, the contractor shall indemnify and hold harmless the owner, the designer and the agents, consultants and employees of the owner and designer, from and against all claims, damages, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from the performance or failure of performance of the work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission of the contractor, the contractor's subcontractor, or the agents of either the contractor or the contractor's subcontractor. Such obligation shall not be construed to negate, abridge or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this article.

#### ARTICLE 45 - TAXES

- a. Federal excise taxes do not apply to materials entering into state work (Internal Revenue Code, Section 3442(3)).
- b. Federal transportation taxes do not apply to materials entering into state work (Internal Revenue Code, Section 3475(b) as amended).
- c. North Carolina sales tax and use tax, as required by law, do apply to materials entering into state work and such costs shall be included in the bid proposal and contract sum.
- d. Local option sales and use taxes, as required by law, do apply to materials entering into state work as applicable and such costs shall be included in the bid proposal and contract sum.
- e. **Accounting Procedures for Refund of County Sales & Use Tax**

Amount of county sales and use tax paid per contractor's statements:

Contractors performing contracts for state agencies shall give the state agency for whose project the property was purchased a signed statement containing the information listed in G.S. 105-164.14(e).

The Department of Revenue has agreed that in lieu of obtaining copies of sales receipts from contractors, an agency may obtain a certified statement as of April 1, 1991 from the contractor setting forth the date, the type of property and the cost of the property purchased from each vendor, the county in which the vendor made the sale and the amount of local sales and use taxes paid thereon. If the property was purchased out-of-state, the county in which the property was delivered should be listed. The contractor should also be notified that the certified statement may be subject to audit.

In the event the contractors make several purchases from the same vendor, such certified statement must indicate the invoice numbers, the inclusive dates of the invoices, the total amount of the invoices, the counties, and the county sales and use taxes paid thereon.

Name of taxing county: The position of a sale is the retailer's place of business located within a taxing county where the vendor becomes contractually obligated to make the sale. Therefore, it is important that the county tax be reported for the county of sale rather than the county of use.

When property is purchased from out-of-state vendors and the county tax is charged, the county should be identified where delivery is made when reporting the county tax.

Such statement must also include the cost of any tangible personal property withdrawn from the contractor's warehouse stock and the amount of county sales or use tax paid thereon by the contractor.

Similar certified statements by his subcontractors must be obtained by the general contractor and furnished to the claimant.

Contractors are not to include any tax paid on supplies, tools and equipment which they use to perform their contracts and should include only those building materials, supplies, fixtures and equipment which actually become a part of or annexed to the building or structure.

#### **ARTICLE 46 - EQUAL OPPORTUNITY CLAUSE**

The non-discrimination clause contained in Section 202 (Federal) Executive Order 11246, as amended by Executive Order 11375, relative to equal employment opportunity for all persons without regard to race, color, religion, sex or national origin, and the implementing rules and regulations prescribed by the secretary of Labor, are incorporated herein.

#### **ARTICLE 47 - EMPLOYMENT OF THE HANDICAPPED**

The contractor(s) agree not to discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant is qualified. The contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices.

#### **ARTICLE 48 - ASBESTOS-CONTAINING MATERIALS (ACM)**

The State of North Carolina has attempted to address all asbestos-containing materials that are to be disturbed in the project. However, there may be other asbestos-containing materials in the work areas that are not to be disturbed and do not create an exposure hazard. Contractors are reminded of the requirements of instructions under Instructions to Bidders and General Conditions of the Contract, titled Examination of Conditions. Statute 130A, Article 19, amended August 3, 1989, established the Asbestos Hazard Management Program that controls asbestos abatement in North Carolina. The latest edition of *Guideline Criteria for Asbestos Abatement* from the State Construction Office is to be incorporated in all asbestos abatement projects for the Capital Improvement Program.



#### **ARTICLE 49 - MINORITY BUSINESS PARTICIPATION**

GS 143-128.2 establishes a ten percent (10%) goal for participation by minority businesses in total value of work for each State building project. The document, *Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts* including Affidavits and Appendix E are hereby incorporated into and made a part of this contract.

#### **ARTICLE 50 – CONTRACTOR EVALUATION**

The contractor's overall work performance on the project shall be fairly evaluated in accordance with the State Building Commission policy and procedures, for determining qualifications to bid on future State capital improvement projects. In addition to final evaluation, interim evaluation may be prepared during the progress of project. The document, Contractor Evaluation Procedures, is hereby incorporated and made a part of this contract. The owner may request the contractor's comments to evaluate the designer.



## SUPPLEMENTARY INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS OF THE CONTRACT

### RELATION TO STANDARD FORMS

The Supplementary Instructions to Bidders and General Conditions of the Contract contain changes and additions to the "Instructions to Bidders and General Conditions of the Contract, Standard Form for Construction Projects, State Construction Office, North Carolina Department of Administration", Form OC-15, Twenty-Third Edition, Revised March 2002. Where any portion of an Article in this document is modified or voided by the Supplementary General Conditions, the unaltered provisions shall remain in effect.

## SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

### **12 - SUBSTITUTIONS**

Add sentence to the paragraph to read:

An addendum will be issued at least 7 days prior to the bid date, listing all approved substitutions. After the issuance of the substitution addendum no further product substitutions will be made except under extenuating circumstances, etc.

## SUPPLEMENTARY GENERAL CONDITIONS OF THE CONTRACT

### **ARTICLE 6 - WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE**

Add to Article 6, Paragraph "c" as follows:

- c. Certification of final payment request will not be made by the Owner until record documents have been received from the Contractor.

### **ARTICLE 14 - CONSTRUCTION SUPERVISION**

Modify Paragraph "e" where "registered land surveyor in the State of North Carolina"...

Delete the second sentence of Paragraph "f" and substitute the following:

For this project the Single Prime Contractor (General/Roofing Contractor) shall be designated as the "Project Expediter".

### **ARTICLE 23 - TIME OF COMPLETION, DELAYS, EXTENSIONS OF TIME**

Change Article 23, Paragraph "b" to read:

- b. The contractors shall commence work to be performed under this agreement on a date to be specified in a written order from the Owner and shall complete all work hereunder within **240 calendar days** of said date. For each day in excess of the above number of days, the Contractor(s) shall pay the Owner **Three hundred dollars (\$300.00)** as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the Owner by reason of failure of said Contractor(s) to complete the work within the time specified, such time being in the essence of this contract and a material consideration thereof.

### **ARTICLE 31 - REQUESTS FOR PAYMENT**

Change the first part of the second sentence of Paragraph "a" to read:

The request shall be on the AIA Document G702 (1992) standard form for Application and Certificate for Payment supplemented by the Continuation sheet, AIA Document G703 (1992) and shall show . . . the following information:

# LINCOLN TON EQUIPMENT SHOP

## **ARTICLE 34 – MINIMUM INSURANCE REQUIREMENTS**

Modify Paragraph "c" to read:

"The Contractor shall purchase and maintain property insurance during the life of this Contract, upon the entire work at the site to the full insurable value thereof. This insurance shall include the interest of the Owner, the Contractor, the subcontractors and subcontractors in the work and shall insure **against risks of direct physical loss – all perils**). If the Owner is damaged by failure of the Contractor to purchase or maintain such insurance, then the Contractor shall bear all reasonable costs properly attributable thereto; the Contractor shall effect and maintain similar property insurance on portions of the work stored off the site when request for payment per articles so includes such portions."

## **ARTICLE 40 - UTILITIES, STRUCTURES, SIGNS**

Change the third sentence of Paragraph "a" to read:

- a. The Project Expediter shall pay all utility costs; delete options (1) and (3) from this paragraph.

Delete the first three (3) sentences of Paragraph "l" of Article 40 and replace with the following:

- l. The Project Expediter will erect one sign on the project at a location to be determined by the Owner. The sign shall be as detailed in Section 10441 – Project Sign, and shall be erected within 14 days of award of Contract.

## **ARTICLE 42 - GUARANTEE**

Add to Paragraph "d" of Article 42 to read:

The CONTRACTOR shall warrant the materials and workmanship of the roofing system against leakage and against defects due to faulty materials, workmanship and contractor negligence for a period of two (2) years following acceptance of the project by the owner. Additionally, the roofing materials shall have a 30 year warranty covering defects due to faulty finish material, see Section 13121.

## **ARTICLE 49 - MINORITY BUSINESS ENTERPRISES**

The MBE Guidelines (GS143-128.2 Effective 1/1/2002) follow the Supplementary General conditions and the MBE Appendices follow the Form of Proposal at the end of this manual.

## **ARTICLE 51 - INDEX OF DRAWINGS**

<u>SHEET NO.</u>	<u>CONTENTS</u>
T1	BLDG. CODE SUMMARY
A1	FLOOR PLAN & INTERIOR ELEVATIONS
A2	REFLECTED CEILING PLAN & MEZZANINE PLAN, MISC. DETAILS
A3	ROOF PLAN & DETAILS
A4	STAIR SECTION & DETAILS
A5	EXTERIOR ELEVATIONS
A6	WALL & BUILDING SECTIONS
A7	WALL SECTIONS, WASH CURTAIN DETAILS
A8	ENLARGED PLAN, INTERIOR ELEVATIONS, DETAILS
A9	FINISH, DOOR & WINDOW SCHEDULES, DETAILS
S1	FOUNDATION PLAN & DETAILS
S2	ROOF FRAMING PLANS & DETAILS
S3	MEZZANINE FRAMING & DETAILS
S4	CRANE RAIL, LIFT PIT & DETAILS
P1	PLUMBING FLOOR PLAN - WASTE
P2	PLUMBING FLOOR PLAN - WATER
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P5	COMPRESSED AIR & OIL INTERCEPTOR DETAILS
M1	MECHANICAL FLOOR PLAN - HVAC
M2	MEZZANINE PLAN - HVAC & DETAILS
M3	MECHANICAL SCHEDULES
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# LINCOLNTON EQUIPMENT SHOP

- E1 ELECTRICAL PLAN – POWER, LEGEND
- E2 ELECTRICAL PLAN - LIGHTING
- E3 MEZZANINE PLAN – POWER & LIGHTING
- E4 POWER RISER & DE TAILS
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- C1 EXISTING SITE PLAN CONDITIONS
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- C3 SITE UTILITY PLAN
- C4 EROSION CONTROL & HC SIGNAGE DETAILS
- C5 RETAINING WALL & DETAILS
- C6 MISC. SITE DETAILS
- C7 SITE FENCING DETAILS
- C8 STORM WATER DRAINAGE FIXTURE DETAILS
- C9 CURB & GUTTER DETAILS



## **GUIDELINES FOR RECRUITMENT AND SELECTION OF MINORITY BUSINESSES FOR PARTICIPATION IN STATE CONSTRUCTION CONTRACTS**

In accordance with G.S. 143-128.2 (effective January 1, 2002) these guidelines establish goals for minority participation in single-prime bidding, separate-prime bidding, construction manager at risk, and alternative contracting methods, on State construction projects in the amount of \$300,000 or more. The legislation provides that the State shall have a verifiable ten percent (10%) goal for participation by minority businesses in the total value of work for each project for which a contract or contracts are awarded. These requirements are published to accomplish that end.

### **SECTION A: INTENT**

It is the intent of these guidelines that the State of North Carolina, as awarding authority for construction projects, and the contractors and subcontractors performing the construction contracts awarded shall cooperate and in good faith do all things legal, proper and reasonable to achieve the statutory goal of ten percent (10%) for participation by minority businesses in each construction project as mandated by GS 143-128.2. Nothing in these guidelines shall be construed to require contractors or awarding authorities to award contracts or subcontracts to or to make purchases of materials or equipment from minority-business contractors or minority-business subcontractors who do not submit the lowest responsible, responsive bid or bids.

### **SECTION B: DEFINITIONS**

1. Minority - a person who is a citizen or lawful permanent resident of the United States and who is:
  - a. Black, that is, a person having origins in any of the black racial groups in Africa;
  - b. Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
  - c. Asian American, that is, a person having origins in any of the original peoples of the Far East, Southeast Asia and Asia, the Indian subcontinent, the Pacific Islands;
  - d. American Indian, that is, a person having origins in any of the original peoples of North America; or
  - e. Female
2. Minority Business - means a business:
  - a. In which at least fifty-one percent (51%) is owned by one or more minority persons, or in the case of a corporation, in which at least fifty-one percent (51%) of the stock is owned by one or more minority persons or socially and economically disadvantaged individuals; and
  - b. Of which the management and daily business operations are controlled by one or more of the minority persons or socially and economically disadvantaged individuals who own it.
3. Socially and economically disadvantaged individual - means the same as defined in 15 U.S.C. 637. "Socially disadvantaged individuals are those who have been subjected to racial or ethnic prejudice or cultural bias because of their identity as a member of a group without regard to their individual qualities". "Economically disadvantaged individuals are those socially disadvantaged individuals whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities as compared to others in the same business area who are not socially disadvantaged".
4. Public Entity - means State and all public subdivisions and local governmental units.
5. Owner - The State of North Carolina, through the Agency/Institution named in the contract.
6. Designer - Any person, firm, partnership, or corporation, which has contracted with the State of North Carolina to perform architectural or engineering work.
7. Bidder - Any person, firm, partnership, corporation, association, or joint venture seeking to be awarded a public contract or subcontract.

8. Contract - A mutually binding legal relationship or any modification thereof obligating the seller to furnish equipment, materials or services, including construction, and obligating the buyer to pay for them.
9. Contractor - Any person, firm, partnership, corporation, association, or joint venture which has contracted with the State of North Carolina to perform construction work or repair.
10. Subcontractor - A firm under contract with the prime contractor or construction manager at risk for supplying materials or labor and materials and/or installation. The subcontractor may or may not provide materials in his subcontract.

### **SECTION C: RESPONSIBILITIES**

1. Office for Historically Underutilized Businesses, Department of Administration (hereinafter referred to as HUB Office).

The HUB Office has established a program, which allows interested persons or businesses qualifying as a minority business under G.S. 143-128.2, to obtain certification in the State of North Carolina procurement system. The information provided by the minority businesses will be used by the HUB Office to:

- a. Identify those areas of work for which there are minority businesses, as requested.
- b. Make available to interested parties a list of prospective minority business contractors and subcontractors.
- c. Assist in the determination of technical assistance needed by minority business contractors.

In addition to being responsible for the certification/verification of minority businesses that want to participate in the State construction program, the HUB Office will:

- (1) Maintain a current list of minority businesses. The list shall include the areas of work in which each minority business is interested.
- (2) Inform minority businesses on how to identify and obtain contracting and subcontracting opportunities through the State Construction Office and other public entities.
- (3) Inform minority businesses of the contracting and subcontracting process for public construction building projects.
- (4) Work with the North Carolina trade and professional organizations to improve the ability of minority businesses to compete in the State construction projects.
- (5) The HUB Office also oversees the minority business program by:
  - a. Monitoring compliance with the program requirements.
  - b. Assisting in the implementation of training and technical assistance programs.
  - c. Identifying and implementing outreach efforts to increase the utilization of minority businesses.
  - d. Reporting the results of minority business utilization to the Secretary of the Department of Administration, the Governor, and the General Assembly.

2. State Construction Office

The State Construction Office will be responsible for the following:

- a. Furnish to the HUB Office a minimum of twenty-one days prior to the bid opening the following:
  - (1) Project description and location;
  - (2) Locations where bidding documents may be reviewed;
  - (3) Name of a representative of the owner who can be contacted during the advertising period to advise who the prospective bidders are;
  - (4) Date, time and location of the bid opening.
  - (5) Date, time and location of prebid conference, if scheduled.
- b. Attending scheduled prebid conference, if necessary, to clarify requirements of the general statutes regarding minority-business participation, including the bidders' responsibilities.



- c. Reviewing the apparent low bidders' statutory compliance with the requirements listed in the proposal, that must be complied with, if the bid is to be considered as responsive, prior to award of contracts. The State reserves the right to reject any or all bids and to waive informalities.
  - d. Reviewing of minority business requirements at Preconstruction conference.
  - e. Monitoring of contractors' compliance with minority business requirements in the contract documents during construction.
  - f. Provide statistical data and required reports to the HUB Office.
  - g. Resolve any protest and disputes arising after implementation of the plan, in conjunction with the HUB Office.
3. Owner  
Before awarding a contract, owner shall do the following:
- a. Develop and implement a minority business participation outreach plan to identify minority businesses that can perform public building projects and to implement outreach efforts to encourage minority business participation in these projects to include education, recruitment, and interaction between minority businesses and non-minority businesses.
  - b. Attend the scheduled prebid conference.
  - c. At least 10 days prior to the scheduled day of bid opening, notify minority businesses that have requested notices from the public entity for public construction or repair work and minority businesses that otherwise indicated to the Office for Historically Underutilized Businesses an interest in the type of work being bid or the potential contracting opportunities listed in the proposal. The notification shall include the following:
    - 1. A description of the work for which the bid is being solicited.
    - 2. The date, time, and location where bids are to be submitted.
    - 3. The name of the individual within the owner's organization who will be available to answer questions about the project.
    - 4. Where bid documents may be reviewed.
    - 5. Any special requirements that may exist.
  - d. Utilize other media, as appropriate, likely to inform potential minority businesses of the bid being sought.
  - e. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals.
  - f. Review, jointly with the designer, all requirements of G.S. 143-128.2(c) and G.S. 143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with corresponding total dollar value of the bid and affidavit listing good faith efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award to the State Construction Office.
  - g. Evaluate documentation to determine good faith effort has been achieved for minority business utilization prior to recommendation of award to State Construction Office.
  - h. Review prime contractors' pay applications for compliance with minority business utilization commitments prior to payment.
  - i. Make documentation showing evidence of implementation of Owner's responsibilities available for review by State Construction Office and HUB Office, upon request
4. Designer  
Under the single-prime bidding, separate prime bidding, construction manager at risk, or alternative contracting method, the designer will:
- a. Attend the scheduled prebid conference to explain minority business requirements to the prospective bidders.
  - b. Assist the owner to identify and notify prospective minority business prime and subcontractors of potential contracting opportunities.
  - c. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals.
  - d. Review jointly with the owner, all requirements of G.S. 143-128.2(c) and G.S.143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with

- corresponding total dollar value of the bid and affidavit listing Good Faith Efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award.
- e. During construction phase of the project, review "MBE Documentation for Contract Payment" – (Appendix E) for compliance with minority business utilization commitments. Submit Appendix E form with monthly pay applications to the owner and forward copies to the State Construction Office.
  - f. Make documentation showing evidence of implementation of Designer's responsibilities available for review by State Construction Office and HUB Office, upon request.
5. Prime Contractor(s), CM at Risk, and Its First-Tier Subcontractors  
Under the single-prime bidding, the separate-prime bidding, construction manager at risk and alternative contracting methods, contractor(s) will:
- a. Attend the scheduled prebid conference.
  - b. Identify or determine those work areas of a subcontract where minority businesses may have an interest in performing subcontract work.
  - c. At least ten (10) days prior to the scheduled day of bid opening, notify minority businesses of potential subcontracting opportunities listed in the proposal. The notification will include the following:
    - (1) A description of the work for which the subbid is being solicited.
    - (2) The date, time and location where subbids are to be submitted.
    - (3) The name of the individual within the company who will be available to answer questions about the project.
    - (4) Where bid documents may be reviewed.
    - (5) Any special requirements that may exist, such as insurance, licenses, bonds and financial arrangements.

If there are more than three (3) minority businesses in the general locality of the project who offer similar contracting or subcontracting services in the specific trade, the contractor(s) shall notify three (3), but may contact more, if the contractor(s) so desires.
  - d. During the bidding process, comply with the contractor(s) requirements listed in the proposal for minority participation.
  - e. Identify on the bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit listing good faith efforts as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).
  - f. Make documentation showing evidence of implementation of PM, CM-at-Risk and First-Tier Subcontractor responsibilities available for review by State Construction Office and HUB Office, upon request.
  - g. Upon being named the apparent low bidder, the Bidder shall provide one of the following: (1) an affidavit (Affidavit C) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal; (2) if the percentage is not equal to the applicable goal, then documentation of all good faith efforts taken to meet the goal. Failure to comply with these requirements is grounds for rejection of the bid and award to the next lowest responsible and responsive bidder.
  - h. The contractor(s) shall identify the name(s) of minority business subcontractor(s) and corresponding dollar amount of work on the schedule of values. The schedule of values shall be provided as required in Article 31 of the General Conditions of the Contract to facilitate payments to the subcontractors.
  - i. The contractor(s) shall submit with each monthly pay request(s) and final payment(s), "MBE Documentation for Contract Payment" – (Appendix E), for designer's review.
  - j. During the construction of a project, at any time, if it becomes necessary to replace a minority business subcontractor, immediately advise the owner, State Construction Office, and the Director of the HUB Office in writing, of the circumstances involved. The prime contractor shall make a good faith effort to replace a minority business subcontractor with another minority business subcontractor.

- k. If during the construction of a project additional subcontracting opportunities become available, make a good faith effort to solicit subbids from minority businesses.
- l. It is the intent of these requirements apply to all contractors performing as prime contractor and first tier subcontractor under construction manager at risk on state projects.

6. Minority Business Responsibilities

While minority businesses are not required to become certified in order to participate in the State construction projects, it is recommended that they become certified and should take advantage of the appropriate technical assistance that is made available. In addition, minority businesses who are contacted by owners or bidders must respond promptly whether or not they wish to submit a bid.

**SECTION 4: DISPUTE PROCEDURES**

It is the policy of this state that disputes that involves a person's rights, duties or privileges, should be settled through informal procedures. To that end, minority business disputes arising under these guidelines should be resolved as governed under G.S. 143-128(g).

**SECTION 5:** These guidelines shall apply upon promulgation on state construction projects. Copies of these guidelines may be obtained from the Department of Administration, State Construction Office, (physical address) 301 North Wilmington Street, Suite 450, NC Education Building, Raleigh, North Carolina, 27601-2827, (mail address) 1307 Mail Service Center, Raleigh, North Carolina, 27699-1307, phone (919) 807-4100, Website: [www.nc-sco.com](http://www.nc-sco.com)

**SECTION 6:** In addition to these guidelines, there will be issued with each construction bid package provisions for contractual compliance providing minority business participation in the state construction program.

## MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)

### APPLICATION:

The **Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts** are hereby made a part of these contract documents. These guidelines shall apply to all contractors regardless of ownership. Copies of these guidelines may be obtained from the Department of Administration, State Construction Office, (physical address) 301 North Wilmington Street, Suite 450, NC Education Building, Raleigh, North Carolina, 27601-2827, (mail address) 1307 Mail Service Center, Raleigh, North Carolina, 27699-1307, phone (919) 807-4100, Website: <http://www.nc-sco.com>

### MINORITY BUSINESS SUBCONTRACT GOALS:

The goals for participation by minority firms as subcontractors on this project have been set at 10%.

The bidder must identify on its bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit (Affidavit A) listing good faith efforts or affidavit (Affidavit B) of self-performance of work, if the bidder will perform work under contract by its own workforce, as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).

The lowest responsible, responsive bidder must provide Affidavit C, that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal.

**OR**

Provide Affidavit D, that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, **with documentation of Good Faith Effort, if the percentage is not equal to the applicable goal.**

**OR**

Provide Affidavit B, which includes sufficient information for the State to determine that the bidder does not customarily subcontract work on this type project.

**The above information must be provided as required. Failure to submit these documents is grounds for rejection of the bid.**

## MINIMUM COMPLIANCE REQUIREMENTS:

All written statements, affidavits or intentions made by the Bidder shall become a part of the agreement between the Contractor and the State for performance of this contract. Failure to comply with any of these statements, affidavits or intentions, or with the minority business Guidelines shall constitute a breach of the contract. A finding by the State that any information submitted either prior to award of the contract or during the performance of the contract is inaccurate, false or incomplete, shall also constitute a breach of the contract. Any such breach may result in termination of the contract in accordance with the termination provisions contained in the contract. It shall be solely at the option of the State whether to terminate the contract for breach.

In determining whether a contractor has made Good Faith Efforts, the State will evaluate all efforts made by the Contractor and will determine compliance in regard to quantity, intensity, and results of these efforts. Good Faith Efforts include:

- (1) Contacting minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor or available on State or local government maintained lists at least 10 days before the bid or proposal date and notifying them of the nature and scope of the work to be performed.
- (2) Making the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bid or proposals are due.
- (3) Breaking down or combining elements of work into economically feasible units to facilitate minority participation.
- (4) Working with minority trade, community, or contractor organizations identified by the Office for Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- (5) Attending any prebid meetings scheduled by the public owner.
- (6) Providing assistance in getting required bonding or insurance or providing alternatives to bonding or insurance for subcontractors.
- (7) Negotiating in good faith with interested minority businesses and not rejecting them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- (8) Providing assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisting minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- (9) Negotiating joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- (10) Providing quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

**APPENDIX E**

**MBE DOCUMENTATION FOR CONTRACT PAYMENTS**

Prime Contractor/Architect: \_\_\_\_\_

Address & Phone: \_\_\_\_\_

Project Name: \_\_\_\_\_

Pay Application #: \_\_\_\_\_ Period: \_\_\_\_\_

The following is a list of payments made to Minority Business Enterprises on this project for the above-mentioned period.

MBE FIRM NAME	* INDICATE TYPE OF MBE	AMOUNT PAID THIS MONTH	TOTAL PAYMENTS TO DATE	TOTAL AMOUNT COMMITTED

\*Minority categories: Black, African American (B), Hispanic (H), Asian American (A), American Indian (I), Female (F), Social and Economically Disadvantage (D)

Date: \_\_\_\_\_ Approved/Certified By: \_\_\_\_\_  
Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

**SUBMIT WITH EACH PAY REQUEST & FINAL PAYMENT**

## **DIVISION 1 – GENERAL REQUIREMENTS**

### **SECTION 01100 - SUMMARY**

#### **PART 1 GENERAL**

##### **1.01 PROJECT**

- A. Project Name: Lincolnnton Equipment Shop.
- B. Owner's Name: NC Department of Transportation.
- C. Designer's Name: Facilities Design, NCDOT.

##### **1.02 WORK BY CONTRACTOR**

- A. The Project consists of the construction of the new Lincolnnton Equipment Shop of approximately 9,495 sq. ft. at the ground floor and 2,171 sq. ft. mezzanine. The new shop building consists of a pre-engineered metal building with architectural concrete masonry exterior walls, painted concrete masonry interior walls, metal roofing and fascia panels, concrete floor slabs at work bays, finished office areas, floor lifts and bridge crane, plumbing, mechanical, and electrical building systems (including utility connections). Work includes rough grading of site, concrete curbs and aprons.
- B. Installation of the below grade water/sand separator.
- C. Relocation of the existing above ground Oil Waste Tank and pump at the end of the project at the time of the project Final Inspection and acceptance.

##### **1.03 CONTRACT DESCRIPTION**

- A. Contract Type: A single prime contract based on a Stipulated Price as described in General Conditions.

##### **1.04 WORK BY OWNER**

- A. Items noted NIC (Not in Contract) will be supplied and installed by NC Department of Transportation after Substantial Completion. Some items include:
  - 1. Vehicle floor lift.
  - 2. Relocation of existing storage building on skids.
  - 3. Asphalt paving the entrance drives.
  - 4. Landscaping at the new shop.

##### **1.05 OWNER OCCUPANCY**

- A. NC Department of Transportation intends to occupy the Project upon Substantial Completion.
- B. Cooperate with NC Department of Transportation to minimize conflict and to facilitate NC Department of Transportation's operations.

##### **1.06 CONTRACTOR USE OF SITE AND PREMISES**

- A. Construction Operations: Limited to areas noted on Drawings within the NCDOT's property.
- B. Arrange use of site and premises to allow:
  - 1. Use of the adjacent site and premises by the NCDOT.

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

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

### **END OF SECTION**

## SECTION 01200 - PRICE AND PAYMENT PROCEDURES

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Procedures for preparation and submittal of application for final payment.

#### 1.02 SCHEDULE OF VALUES

- A. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered. Submit Schedule of Values 15 days after the Pre-Construction Conference for review.
- B. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization.
- C. Revise schedule to list approved Change Orders, with each Application For Payment.

#### 1.03 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Present required information in typewritten form.
- C. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
- D. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of work.
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place and Stored Materials under this Application.
  - 6. Authorized Change Orders.
  - 7. Total Completed and Stored to Date of Application.
  - 8. Percentage of Completion.
  - 9. Balance to Finish.
  - 10. Retainage.
- E. Execute certification by signature of authorized officer.
- F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.
- G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
- H. Submit five copies of each Application for Payment.

#### 1.04 MODIFICATION PROCEDURES

- A. Designer will advise of minor changes in the Work not involving an adjustment to Contract Sum or Contract Time as authorized by the Conditions of the Contract by issuing supplemental instructions on AIA Form G710.
- B. Construction Change Directive: Designer may issue a document, signed by NC Department of Transportation, instructing Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  - 1. The document will describe changes in the Work, and will designate method of determining any change in Contract Sum or Contract Time.
  - 2. Promptly execute the change in Work.
- C. Proposal Request: Designer may issue a document which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change. Contractor shall prepare and submit a fixed price quotation within a minimum of 7- days.
- D. Computation of Change in Contract Amount:
  - 1. For change requested by Designer for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.



## **LINCOLN TON EQUIPMENT SHOP**

- E. Substantiation of Costs: Provide full information required for evaluation.
  - 1. On request, provide following data:
    - a. Quantities of products, labor, and equipment.
    - b. Taxes, insurance, and bonds.
    - c. Overhead and profit.
    - d. Justification for any change in Contract Time.
    - e. Credit for deletions from Contract, similarly documented.
- F. Execution of Change Orders: Designer will issue Change Orders for signatures of parties as provided in the Conditions of the Contract on State Construction's form.

### **1.05 APPLICATION FOR FINAL PAYMENT**

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
  - 1. All closeout procedures specified in Section 01780.

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

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

### **END OF SECTION**

**SECTION 01230 –UNIT PRICES**

**PART 1 - GENERAL**

**1.01 UNIT PRICE LIST**

**A. Unit Price No. 1: Rock Excavation.**

1. The Unit Price shall include the costs of excavation and disposal of rock material and the placement and compaction of select material.
2. The Base Bid shall include an allowance of 10 cu. yds. for the removal of expected rock and replacement with compacted fill material.
3. As specified in section 02100-Rock Excavation.

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

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

**END OF SECTION 01230**

## SECTION 01300 - ADMINISTRATIVE REQUIREMENTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Pre-Construction meeting.
- B. Progress meetings.
- C. Construction progress schedule.
- D. Submittals for review, information, and project closeout.
- E. Number of copies of submittals.
- F. Submittal procedures.

#### 1.02 PROJECT COORDINATION

- A. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for site access, traffic, and parking facilities.
- B. During construction, coordinate use of site and facilities through the Project Coordinator.
- C. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- D. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.
- E. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- F. Make the following types of submittals to Designer through the Project Coordinator:
  1. Requests for interpretation.
  2. Requests for substitution.
  3. Shop drawings, product data, and samples.
  4. Test and inspection reports.
  5. Manufacturer's instructions and field reports.
  6. Applications for payment and change order requests.
  7. Progress schedules.
  8. Coordination drawings.
  9. Closeout submittals.

### PART 2 PRODUCTS - NOT USED

### PART 3 EXECUTION

#### 3.01 PRECONSTRUCTION MEETING

- A. Designer will schedule a meeting after Notice of Award.
- B. Attendance Required:
  1. NC Department of Transportation.
  2. Designer.
  3. Contractor.
  4. State Construction Office.
- C. Agenda:
  1. Execution of NC Department of Transportation-Contractor Agreement.
  2. Submission of executed bonds and insurance certificates.
  3. Distribution of Contract Documents.
  4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
  5. Designation of personnel representing the parties to Contract, subcontractors, and Designer.
  6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures per State Construction Office's Agenda.
  7. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Contractor, Designer, NC Department of Transportation, State Construction Office, and those affected by decisions made.

## 3.02 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Designer will make arrangements for meetings, prepare agenda according to State Construction's manual with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, NC Department of Transportation, Designer, and State Construction Office, as appropriate to agenda topics for each meeting.
- D. Agenda:
  - 1. Review minutes of previous meetings.
  - 2. Review of Work progress.
  - 3. Field observations, problems, and decisions.
  - 4. Identification of problems which impede planned progress.
  - 5. Review of submittals schedule and status of submittals.
  - 6. Maintenance of progress schedule.
  - 7. Corrective measures to regain projected schedules.
  - 8. Planned progress during succeeding work period.
  - 9. Maintenance of quality and work standards.
  - 10. Effect of proposed changes on progress schedule and coordination.
  - 11. Other business relating to Work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Designer, NC Department of Transportation, participants, and those affected by decisions made.

## 3.03 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
  - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule at each Monthly Meeting or with each Application for Payment.

## 3.04 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
  - 3. Samples for selection.
  - 4. Samples for verification.
- B. Submit to Designer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01780 - CLOSEOUT SUBMITTALS.

## 3.05 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
  - 1. Design data.
  - 2. Certificates.
  - 3. Test reports.
  - 4. Inspection reports.
  - 5. Manufacturer's instructions.
  - 6. Manufacturer's field reports.
  - 7. Other types indicated.
- B. Submit for Designer's knowledge as contract administrator or for NC Department of Transportation. No action will be taken.

**3.06 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. When the following are specified in individual sections, submit them at project closeout:
  - 1. Project record documents.
  - 2. Operation and maintenance data.
  - 3. Warranties.
  - 4. Contractor's Affidavits, Notice of Cancellation of Builders Risk Insurance, and Consent of Surety Company to Final Payment.
  - 5. Other types as indicated.
- B. Submit for NC Department of Transportation's benefit during and after project completion.

**3.07 NUMBER OF COPIES OF SUBMITTALS**

- A. Documents for Review:
  - 1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies which the Contractor requires, plus two copies which will be retained by the Designer.
  - 2. Larger Sheets, Not Larger Than 24x36: Submit one reproducible transparency and one opaque reproduction.
- B. Documents for Information: Submit two copies.
- C. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.
- D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Designer.
  - 1. After review, produce duplicates.
  - 2. Retained samples will not be returned to Contractor unless specifically so stated.

**3.08 SUBMITTAL PROCEDURES**

- A. Transmit each submittal with AIA Form G810.
- B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- C. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- E. Deliver submittals to Designer at business address.
- F. Schedule submittals to expedite the Project, and coordinate submission of related items.
- G. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- H. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- I. Provide space for Contractor and Designer review stamps.
- J. When revised for resubmission, identify all changes made since previous submission.
- K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- L. Submittals not requested will not be recognized or processed.

**END OF SECTION**

## SECTION 01400 - QUALITY REQUIREMENTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. References and standards.
- B. Quality assurance submittals.
- C. Control of installation.
- D. Testing and inspection services.

#### 1.02 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Designer before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Designer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

#### 1.03 TESTING AND INSPECTION AGENCIES

- A. NC Department of Transportation will perform the services as the independent testing agency for all other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

### PART 2 PRODUCTS - NOT USED

### PART 3 EXECUTION

#### 3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Designer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

#### 3.02 TESTING AND INSPECTION

- A. See individual specification sections for testing required.
- B. Testing Agency Duties:
  - 1. Provide qualified personnel at site. Cooperate with Designer and Contractor in performance of services.
  - 2. Perform specified sampling and testing of products in accordance with specified standards.
  - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 4. Promptly notify Designer and Contractor of observed irregularities or non-conformance of Work or products.

## LINCOLNTON EQUIPMENT SHOP

5. Perform additional tests and inspections required by Designer.
  6. Submit reports of all tests/inspections specified.
- C. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
  2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  4. Notify Designer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  6. Arrange with NC Department of Transportation's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Designer. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Price.

### 3.03 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of Designer, it is not practical to remove and replace the Work, Designer will direct an appropriate remedy or adjust payment.

## END OF SECTION

## SECTION 01600 - PRODUCT REQUIREMENTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations and procedures.
- E. Spare parts and maintenance materials.

#### 1.02 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

### PART 2 PRODUCTS

#### 2.01 PRODUCTS

- A. Provide interchangeable components of the same manufacture for components being replaced.
- B. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.
- C. Cord and Plug: Provide minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

#### 2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed, unless approved by the Designer 14-days prior to the bid opening, see Supplementary General Conditions.

#### 2.03 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

### PART 3 EXECUTION

#### 3.01 SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- C. A request for substitution constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Will provide the same warranty for the substitution as for the specified product.
  - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to NC Department of Transportation.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.



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- D. Substitution Submittal Procedure:
1. Submit three copies of request for substitution for consideration 14-days prior to the bid opening. Limit each request to one proposed substitution.
  2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
  3. The Designer will notify Contractor in writing of decision to accept or reject request.

### 3.02 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

### 3.03 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.
- E. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**END OF SECTION**

## SECTION 01700 - EXECUTION REQUIREMENTS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Cutting and patching.
- B. Closeout procedures, except payment procedures.

#### 1.02 SUBMITTALS

- A. Cutting and Patching: Submit written request in adHenderson of cutting or alteration which affects:
  - 1. Structural integrity of any element of Project.
  - 2. Integrity of weather exposed or moisture resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight exposed elements.
  - 5. Work of NC Department of Transportation or separate Contractor.

### PART 2 PRODUCTS

#### 2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01600.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Beginning new work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- E. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

#### 3.02 PREPARATION

- A. Prepare surfaces and remove surface finishes to provide for proper installation of new work and finishes.
- B. Clean substrate surfaces prior to applying next material or substance.
- C. Seal cracks or openings of substrate prior to applying next material or substance.
- D. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

#### 3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Install Products as specified in individual sections.
- B. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new Work abuts or aligns with existing, perform a smooth and even transition.
- C. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Designer.

#### 3.04 CUTTING AND PATCHING

- A. Execute cutting and patching including excavation and fill to complete the work, to uncover work to install

## LINCOLN TON EQUIPMENT SHOP

improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit Products together to integrate with other work.

- B. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- C. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- E. Restore work with new Products in accordance with requirements of Contract Documents.
- F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- G. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

### 3.05 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

### 3.06 PROTECTION OF INSTALLED WORK

- A. Protect installed work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

### 3.07 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

### 3.08 FINAL CLEANING

- A. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- B. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- C. Clean filters of operating equipment.
- D. Clean debris from roofs, gutters, downspouts, and drainage systems.
- E. Clean site; sweep paved areas, rake clean landscaped surfaces.
- F. Remove waste and surplus materials, rubbish, and construction facilities from the site.

### 3.09 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
- B. Notify Designer when work is considered ready for Substantial Completion.
- C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Designer's review.
- D. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to NC Department of Transportation-occupied areas.
- E. Notify Designer when work is considered finally complete.
- F. Complete items of work determined by Designer's final inspection.

## END OF SECTION

## SECTION 01780 - CLOSEOUT SUBMITTALS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

#### 1.02 RELATED SECTIONS

- A. Section 01300 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Individual Product Sections: Specific requirements for operation and maintenance data.
- C. Individual Product Sections: Warranties required for specific products or Work.

#### 1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Designer with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Designer will review draft and return one copy with comments.
  - 2. For equipment, or component parts of equipment put into service during construction and operated by NC Department of Transportation, submit completed documents within ten days after acceptance.
  - 3. Submit 1 copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Designer comments. Revise content of all document sets as required prior to final submission.
  - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
  - 1. For equipment or component parts of equipment put into service during construction with NC Department of Transportation's permission, submit documents within ten days after acceptance.
  - 2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

### PART 2 PRODUCTS - NOT USED

### PART 3 EXECUTION

#### 3.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Addenda.
  - 3. Change Orders and other modifications to the Contract.
- B. Ensure entries are complete and accurate, enabling future reference by NC Department of Transportation.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Record Drawings: Legibly mark each item to record actual construction including:
  - 1. Field changes of dimension and detail.
  - 2. Details not on original Contract drawings.

#### 3.02 OPERATION AND MAINTENANCE DATA

- A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

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- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

### 3.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
  - 1. Description of unit or system, and component parts.
  - 2. Identify function, normal operating characteristics, and limiting conditions.
  - 3. Include performance curves, with engineering data and tests.
  - 4. Complete nomenclature and model number of replaceable parts.
- B. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- C. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and re-assembly instructions; and alignment, adjusting, balancing, and checking instructions.
- D. Provide servicing and lubrication schedule, and list of lubricants required.
- E. Include manufacturer's printed operation and maintenance instructions.
- F. Include sequence of operation by controls manufacturer.
- G. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- H. Provide control diagrams by controls manufacturer as installed.
- I. Include test and balancing reports.
- J. Additional Requirements: As specified in individual product specification sections.

### 3.04 OPERATION AND MAINTENANCE MANUALS

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-1/2 x 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- F. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Designer, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.
    - c. Parts list for each component.
    - d. Operating instructions.
    - e. Maintenance instructions for equipment and systems.
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Shop drawings and product data.
    - b. Air and water balance reports.
    - c. Certificates.
    - d. Photocopies of warranties and bonds.

### 3.05 WARRANTIES, AFFIDAVITS AND BONDS

- A. Obtain warranties, affidavits and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put

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into use with NC Department of Transportation's permission, leave date of beginning of time of warranty until the Date of Acceptance is determined.

- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 x 11 inch three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES, AFFIDAVITS AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

**END OF SECTION**

## DIVISION 2 – SITE WORK

### SECTION 02040--SEWER PIPE AND APPURTENANCE MATERIALS

#### PART 1 – GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract and Supplementary Conditions and Division 1 Specifications Sections, apply to work of this sections.
- B. Rock Excavation 02100
- C. Earthwork 02300

##### 1.2 DESCRIPTION OF WORK

These specifications shall apply to the materials to be furnished and installed to complete the sanitary sewer line installations in accordance with the plans. All pipe and appurtenances shall be of the class and type as indicated on the plans and designated herein.

##### 1.3 SUBMITTALS

- A. Product Data: For each type of pipe, fitting, manhole and appurtenance.
- B. Shop Drawings: Not required.

##### 1.4 QUALITY ASSURANCE AND TESTING

- A. Infiltration and Exfiltration  
All sanitary sewers shall be flushed with water in sufficient volume to obtain free, clear and unobstructed flow through each line. All obstructions shall be removed and all defects corrected.

When the sewers are completed, they shall be inspected by the Engineer for conformance with the provisions of the plans and specifications, particularly line and grade, and tested to determine the amount of ground water infiltration into the sewer. All visible and audible leaks will be stopped and the remaining infiltration will be measured using a V-notch weir and/or other devices, which shall be furnished by the Contractor. The Contractor shall also furnish all required assistance for measuring the infiltration.

If infiltration into the whole system or any segment thereof exceeds 100 gallons per 24 hours per inch of diameter per mile of sewer, necessary corrective measures shall be taken by the Contractor to limit the infiltration to the maximum specified above. The Engineer shall decide the number and length of segments of sewer line on which the testing shall be performed.

Each section of pipe line between manholes shall be tested with a low pressure air test in accordance with ASTM C-828, or an exfiltration test in accordance with ASTM C-969. Testing according to ASTM C-828 shall use a test pressure of 3.5 psig with a maximum drop to 2.5 psig in the time specified, based on pipe diameter and length, as shown in Table 02040.

Each section of reinforced concrete pipe shall be tested with either a low pressure air test in accordance with ASTM C-924 or an exfiltration test in accordance with ASTM C-969.

Should any test of any section of pipe line disclose an air loss or exfiltration greater than permitted, the Contractor shall at his own expense locate and repair the defective joints or pipe sections. After the repairs are completed, the line shall be retested until the pipe line holds the pressure within the allowable pressure drop or exfiltration limit. The Contractor shall furnish all devices and assistance necessary to conduct low pressure air tests and exfiltration tests.

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Manholes which are to be tested for exfiltration shall be determined by the Engineer. Those manholes which are to be tested shall have inlet and outlet pipes plugged to withstand the test pressure. The manhole is to then be slowly filled with water by the Contractor. After absorption, into the manhole walls has stabilized, the water is filled to the test level. After a 15 minute test period, the drop in a water elevation is measured and the loss of water calculated, or the water level restored to the initial test level and the amount added used to determine the leakage rate. If the exfiltration exceeds 0.1 gallon per hour per foot of diameter per foot of head, necessary corrective measures shall be taken by the Contractor to limit the exfiltration to the maximum specified. The Contractor shall furnish all devices and assistance to conduct this exfiltration test.

The Engineer may elect to perform only visual inspection of manholes in lieu of hydrostatic testing. In this case, all manholes must be free of any appearance of infiltration or damage before being accepted. Also, each manhole must be clean and free of any debris.

### B. Deflection

Deflection tests shall be performed on all pipe installations. The testing shall be conducted after the final backfill has been in place at least 30 days, or as an alternative, the test may begin as soon as the backfill is certified by a soil testing form to be compacted to at least 95% of maximum density.

All pipe shall pass a go-no go mandrel sized to 95% of the pipe diameter (as determined by ASTM D2122) with the pipe in place and properly backfilled. All pipe which will not pass the mandrel shall be relaid or replaced by the Contractor at no additional cost. The allowable deflection (not to exceed 5%) shall be calculated using the pipe stiffness formula in ASTM D2321.

The Contractor shall supply the appropriate size mandrel for each size line being tested. The Contractor is also to supply all necessary pull ropes and assistance for passing the mandrel through the pipe. Mechanical pulling devices will not be permitted.

TABLE 02040  
AIR TEST TABLE  
Based on Formulas from ASTM C 828  
Specification Time (min:sec) required for Pressure Drop  
From 3-1/2 to 2-1/2 PSIG  
When Testing One Pipe Diameter Only

Pipe Diameter (Inches)	8	12	15	18	21
Line Length (Feet)					
25	0:18	0:40	1:02	1:29	2:01
50	0:35	1:19	2:04	2:58	4:03
75	0:53	1:59	3:06	4:27	6:04
100	1:10	2:38	4:08	5:56	8:05
125	1:28	3:18	5:09	7:26	9:55
150	1:46	3:58	6:11	8:30	
175	2:03	4:37	7:05		
200	2:21	5:17			
225	2:38	5:40			10:25
250	2:56			8:31	11:35
275	3:14			9:21	12:44
300	3:31			10:12	13:53
350	3:47		8:16	11:54	16:12
400		6:03	9:27	13:36	18:31
450		6:48	10:38	15:19	20:50
500		7:34	11:49	17:01	23:09



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## PART 2 – PRODUCTS

### 2.1 GENERAL

All materials shall be first quality with smooth interior and exterior surfaces, free from cracks, blisters, honeycombs and other imperfections, and true to theoretical shapes and forms throughout. All materials shall be subject to the inspection of the Engineer at the plant, trench, or other point of delivery, for the purpose of culling and rejecting material, which does not conform to the requirements of these specifications. Such material shall be marked by the Engineer and the Contractor shall remove it from the project site upon notice being received of its rejection.

As particular specifications are cited, the designation shall be construed to refer to the latest revision under a new number except provisions in revised specifications, which are clearly inapplicable.

### 2.2 PIPE AND FITTINGS

Service Lateral Pipe and Fittings: All 4" and 6" sewer service lateral pipe, if shown on the Drawings, shall be PVC Schedule 40 conforming to ASTM D1785. Fittings shall be PVC Schedule 40 conforming to ASTM D2466. All PVC Schedule 40 pipe joints shall be solvent welded in accordance with ASTM D2855.

### 2.3 MANHOLES

#### A. Resilient Connectors

A flexible pipe to manhole connector shall be employed in the connection of sanitary sewer pipe to precast manholes. All resilient connectors shall be in conformance with ASTM C-923—Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.

The connector shall be designed such that positive seal is accomplished between the connector and the manhole wall and between the connector and the pipe. Stainless steel straps shall be used at each pipe to connector joint.

#### B. Mortar

Mortar for masonry in sewer structures shall be 1:2 cement sand mix, except that hydrated lime may be substituted for not more than 10% by weight of the cement.

## PART 3 – EXECUTION

### 3.1 HANDLING AND STORING MATERIALS

The Contractor shall unload pipe so as to avoid deformation or other injury thereto. Pipe shall not be rolled or dragged over gravel or rock during handling. When any joint or section of pipe is damaged during transporting, unloading, handling, or storing, the undamaged portions of the joint or section may be used where partial lengths are needed, or, if damaged sufficiently, the Engineer will reject the joint or section as being unfit for installation.

If any defective pipe is discovered after installation, it shall be removed and replaced with sound pipe or shall be repaired by the Contractor in an approved manner and at his own expense.

The Contractor shall store all pipe in an approved manner. The pipe interior, sealing surfaces, fittings, and other accessories shall be kept clean. Pipe bundles shall be stored on flat surfaces with uniform support. Stored pipe shall be protected from prolonged exposure to sunlight with a canvas or other opaque covering. Air circulation shall be provided under any covering. Gaskets shall not be exposed to oil, grease, ozone, excessive heat, or direct sunlight. The pipe manufacturer for each type of pipe shall be consulted for specific storage and handling recommendations.

### 3.2 PREPARATION OF PIPE FOUNDATION

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The pipe foundation shall be prepared to be uniformly firm and shape be true to the lines and grades as shown on the Contract Drawings. Any deviation or field adjustment will require the approval of the Engineering. The Contractor shall be responsible for the finished work conforming to proper line and grade.

The sides of trenches shall be kept as nearly vertical as possible.

Whenever the nature of the ground will permit, the excavations at the bottom of the trench shall have the shape and dimensions of the outside lower third of the circumference of the pipe, care being taken to secure a firm bearing support uniformly throughout the length of the pipe. A space shall be excavated under and around each bell to sufficient depth to relieve it of any load and to allow ample space for filling and finishing the joint. The pipe, when thus bedded firmly, shall be on the exact grade. In case the bed shape in the bottom of the trench is too low, the pipe shall be completely removed from position, and earth of suitable quality shall be placed and thoroughly tamped to prepare a new foundation for the pipe. In no case shall the pipe be brought to grade by blocking up under the barrel or bell of the same, but a new and uniform support must be provided for the full length of the pipe. Where rock or boulders are encountered in the bottom of the trench, the same shall be removed to such depth that no part of the pipe, when laid to grade, will be closer to the rock or boulders than 6 inches. A suitable tamped and shaped foundation of approved material shall be placed to bring the bottom of the trench to proper subgrade over rock or boulders.

The preparation of pipe bedding shall be in accordance with the typical trench cross sections as shown on the Contract Drawings for the type of pipe being installed. Crushed stone used for pipe bedding shall be placed so that the material fills and supports the haunch area and encases the pipe to the limits shown on the trench cross sections.

When the foundation material is found to be of poor supporting value, the Engineer may make minor adjustment in the location of the pipe to provide a more suitable foundation. Where this is not practical, the foundation shall be conditioned by removing the existing foundation material by undercutting to the depth as directed by the Engineer and backfilling with foundation conditioning material consisting of crushed stone.

Crushed stone for pipe bedding and for foundation conditioning is to be size #67 in ASTM designation D 488, "Standard Sizes of Coarse Aggregate for Highway Construction" (AASHTO M-43, size #67).

The Contractor shall remove all water, which may be encountered, or which may accumulate in the trenches by pumping or building and no pipes shall be laid until the water has been removed from the trench. Water so removed from the trench must be disposed of in such a manner as not to cause injury to work completed or in progress, and shall be disposed of in accordance with the North Carolina Sedimentation Pollution Control Act.

### 3.3 LAYING PIPE

All piping is to be installed in strict accordance with the manufacturer's recommendations and the contract material specifications.

Proper tools, implements, and facilities satisfactory to the Engineer shall be provided and used for the safe and convenient prosecution of pipe laying. All pipe and other materials used in the laying of pipe will be lowered into the trench piece by piece by means of a suitable equipment in such a manner to prevent damage to the pipe, materials, to the protective coating on the pipe materials, and to provide a safe working condition to all personnel in the trench. Each piece of pipe being lowered into the trench shall be clean, sound and free from defects. It shall be laid on the prepared foundation, as specified elsewhere to produce a straight line on a uniform grade, each pipe being laid so as to form a smooth and straight inside flow line. Pipe shall be removed at any time if broken, injured or displaced in the process of laying same, or of backfilling the trench.

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When cutting short lengths of pipe, a pipe cutter as approved by the Engineer will be used and care will be taken to make the cut at right angles to the centerline of the pipe or on the exact skew as shown on the plans. In the case of push-on pipe, the cut ends shall be tapered with a portable grinder or coarse file to match the manufactured taper.

All pipe shall be laid with the groove or bell end up grade, and the spigot or tongue fully inserted. All pipe joints will be constructed in strict accordance with the pipe manufacturer's specifications and materials and any deviation must have prior approval of the Engineer. If any pipe deflection is permitted by the Engineer, then the maximum deflection per joint of pipe shall be that deflection recommended by the manufacturer. A stopper or plug shall be installed in the pipe mouth when pipe laying is not in progress.

### 3.4 BACKFILLING

The initial backfill for class B, C, and D bedding shall be carefully placed to a level 12 inches over the top of the pipe. This backfill shall be excavated soil free from debris, organic material and rock and stones greater than 2" in any dimension. Initial backfill is to be deposited uniformly on both sides of the pipe so as to insure adequate stability of the installed pipe. Initial backfill shall be placed so that the material fills and supports the haunch area and encases the pipe to the limits shown on the trench cross sections on the Contract Drawings.

Final backfill for pipelines shall be defined as that portion of the trench from an imaginary line drawn 12 inches above the top of the pipe to the original ground surface. Final backfill will be done with suitable excavated material. Debris, material not given to adequate compaction, and stone over one cubic foot will not be allowed within the trench limits. If material excavated is not suitable for backfilling, the Contractor shall, at no increased cost to the Owner, remove and dispose of such unsatisfactory material and shall backfill the trench with suitable material obtained elsewhere.

Where pipelines are installed within the ditch to ditch limits of any roadway, driveway or parking area etc., backfill shall be compacted to a minimum dry density of 95 percent of the maximum dry density in pounds per cubic foot as determined by the Standard Proctor Compaction Test.

Backfill material shall be thoroughly tamped or rolled to the required degree of compaction by sheepfoot or pneumatic rollers, mechanical tampers, vibrators, etc. Successive layers shall not be placed until the layer under construction has been thoroughly compacted.

In areas outside the ditch to ditch limits of a roadway, driveway, parking areas, etc., backfill shall be compacted to 90% of the maximum dry density as determined by the Standard Proctor Test. Any settlement shall be immediately corrected.

If determined necessary by the Engineer, or if indicated on the Drawings, compaction testing will be required to verify satisfactory compaction. Any backfill which does not have satisfactory density shall be handled and replaced with backfill compacted to the required density. The cost for compaction testing will be paid for by the Contractor.

Heavy equipment shall not be operated over any pipe until it has been properly backfilled and has a minimum cover of 24 inches. Where any part of the required cover is above the proposed finish grade, the Contractor shall place, maintain, and finally remove such material at no cost to the Owner. Pipe which becomes misaligned, shows excessive settlement, or has been otherwise damaged by the Contractor's operations shall be removed and replaced by the Contractor at no cost to the Owner.

The Contractor shall maintain all pipes installed in a condition that they will function continuously from the time the pipe is installed until the project is accepted.

### END OF SECTION

## LINCOLN TON EQUIPMENT SHOP

# SECTION 02050--WATER PIPE AND APPURTENANCE MATERIAL

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and Division 1 Specification Sections, apply to this Section.
- B. Earthwork 02300, Rock Excavation 02100

### 1.2 DESCRIPTION OF WORK

These specifications shall apply to the materials to be furnished and installed to complete the waterline installations in accordance with the plans. All pipe and appurtenances shall be of the class and type as indicated on the plans or as designated herein.

### 1.3 SUBMITTALS

- A. Product Data: For each type of pipe, fitting, enclosure, and other product specified.
- B. Shop Drawings: Not required.

## PART 2 – PRODUCTS

### 2.1 GENERAL

All materials shall be first quality with smooth interior and exterior surfaces, free from cracks, blisters, honeycombs, and other imperfections, and true to theoretical shapes and forms throughout. All materials shall be subject to the inspection of the Architect at the plant, trench, or other point of delivery, for the purpose of culling and rejecting material which does not conform to the requirements of these specifications. Such material shall be marked by the Architect, and the Contractor shall remove it from the project site upon notice being received of its rejection.

As specific specifications are cited, the designation shall be construed to refer to the latest revisions under the same specification number, or to superseding specifications under a new number, except provisions in revised specifications which are clearly inapplicable.

### 2.2 PIPE

#### Water Service Pipe

All water service pipe ¾" through 2" diameter shall be PVC Schedule 40 conforming to ASTM D1785, with solvent welded joints in accordance with ASTM D2855.

### 2.3 WATER METERS

The water meters shall be all bronze with stainless steel trim displacement type meeting the requirements of AWWA Specification C-700, latest revision. Frost protection devices shall be provided and be of such design that they will yield or break under normal freezing conditions to minimize damage to any other part of the meter. All meters shall have hermetically sealed, tamper-proof magnetic drive registers with straight reading dials in U.S. gallons and full sweep test circles. Water meters shall be similar to existing meters used in the owner's system.

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### **2.4 WATER METER BOX**

Water meter boxes shall be provided for each meter, and for each backflow prevention valve where required. Boxes for meters shall have a hinged cast iron reading lid. The meter box shall have a minimum depth of 30-inches and shall have adequate space for housing the assembly. Meter boxes shall be placed on brick supports and installed flush with the existing grade.

## **PART 3 - EXECUTION**

### **3.1 HANDLING AND STORING MATERIALS**

The Contractor shall unload pipe so as to avoid deformation of other injury thereto. Pipe shall not be rolled or dragged over gravel or rock during handling. When any joint or section of pipe is damaged during transporting, unloading, handling, or storing, the undamaged portions of the joint or section may be used where partial lengths are needed, or, if damaged sufficiently, the Engineer will reject the joint or section as being unfit for installation.

If any defective pipe is discovered after installation, it shall be removed and replaced with sound pipe or shall be repaired by the Contractor in an approved manner and at his own expense.

### **3.2 PREPARATION OF PIPE FOUNDATION**

The pipe foundation shall be prepared to be uniformly firm and shall be true to the lines and grades as shown on the Contract Drawings. Any deviation or field adjustment will require the approval of the Engineer. The Contractor shall be responsible for the finished work conforming to proper line and grade.

The trench shall be prepared to the depth at which the top of the pipe is 42-inches below natural ground or below the frost line, whichever is greater.

Whenever the nature of the ground will permit, the excavations at the bottom of the trench shall have the shape and dimensions of the outside lower third of the circumference of the pipe, care being taken to secure a firm bearing support uniformly throughout the length of the pipe. A space shall be excavated under and around each bell to sufficient depth to relieve it of any load and to allow ample space for filling and finishing the joint. The pipe, when thus bedded firmly, shall be on the exact grade. In case the bed shape in the bottom of the trench is too low, the pipe shall be completely removed from position, and earth of suitable quality shall be placed and thoroughly tamped to prepare a new foundation for the pipe. In no case shall the pipe be brought to grade by blocking up under the barrel or bell of the same, but a new and uniform support must be provided for the full length of the pipe. Where rock or boulders are encountered in the bottom of the trench, the same shall be removed to such depth that no part of the pipe, when laid to grade, will be closer to the rock or boulders than 6 inches. A suitable tamped and shaped foundation of approved material shall be placed to bring the bottom of the trench to proper subgrade over rock or boulders.

Where the foundation material is found to be of poor supporting value, the Engineer may make minor adjustment in the location of the pipe to provide a more suitable foundation. Where this is not practical, the foundation shall be conditioned by removing the existing foundation material by undercutting to the depth as directed by the Engineer and backfilling with foundation conditioning material consisting of crushed stone or gravel or a combination of sand and crushed stone or gravel approved by the Engineer as being suitable for the purpose intended. The selection of the type of backfill material to be used for the foundation conditioning will be made by the Engineer.

The Contractor shall remove all water which may be encountered or which may accumulate in the trenches by pumping or bailing and no pipes shall be laid until the water has been removed from

## LINCOLN TON EQUIPMENT SHOP

the trench. Water so removed from the trench must be disposed of in such a manner as not to cause injury to work completed or in progress.

### 3.3 LAYING PIPE

All piping is to be installed in strict accordance with the manufacturer's recommendations and the contract material specifications.

Proper tools, implements, and facilities satisfactory to the Engineer shall be provided and used for the safe and convenient prosecution of pipe laying. All pipe and other materials used in the laying of pipe will be lowered into the trench piece by piece by means of suitable equipment in such a manner to prevent damage to the pipe, materials, to the protective coating on the pipe materials, and to provide a safe working condition to all personnel in the trench. Each piece of pipe being lowered into the trench shall be clean, sound and free from defects. It shall be laid on the prepared foundation, as specified elsewhere to produce a straight line on a uniform grade, each pipe being laid so as to form a smooth and straight inside flow line. Pipe shall be removed at any time if broken, injured or displaced in the process of laying same, or of backfilling the trench.

When cutting short lengths of pipe, a pipe cutter as approved by the Engineer will be used and care will be taken to make the cut at right angles to the centerline of the pipe or on the exact skew as shown on the plans. In the case of push-on pipe, the cut ends shall be tapered with a portable grinder or coarse file to match the manufactured taper.

All pipe shall be laid with the groove or bell end upgrade, and the spigot or tongue fully inserted. All pipe joints will be constructed in strict accordance with the pipe manufacturers specifications and materials and any deviation must have prior approval of the Engineer. In addition to the manufacturer's specifications, the following joint assembly procedures will be followed:

1. "Push-on": "Push-on" type joints, shall be prepared by removing all dirt or foreign material from the bell end of the pipe and inserting the gasket. The spigot end of the pipe shall be prepared by cleaning and applying a thin coat of approved lubricant after which the spigot end is centered in the bell and pushed on. The procedure in making up this joint shall be performed in accordance with the recommendations of the manufacturer.
2. Mechanical Joint: When "making up" mechanical joints, the spigot end of each pipe shall be entered into the adjoining shall be properly centered and have uniform space all around for reception of the packing material.

The packing material, bolts, nuts, and other accessories used in making mechanical or sleeve type joints shall be obtained from the manufacturer of the pipe and joint.

The surface of the spigot and bell are to be thoroughly cleaned just prior to assembling. The spigot end is to be cleaned just prior to slipping the gasket on the entering into the bell.

When tightening bolts, it is essential that the glands be brought up toward the pipe flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. This is to be done by partially tightening the bottom bolt first, then the top bolt, next two bolts at either side, and last, the remaining bolts. Repeat this cycle until all bolts are within the range of the torques listed below

<u>Bolt Size (Inches)</u>	<u>Range of Torque (Ft./Lbs.)</u>
5/8	40-60
3/4	60-90
1	70-100
1 1/4	90-120

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If effect of sealing is not obtained at the maximum torques indicated above, the joint must be disassembled and reassembled.

Whenever shown on the Contract Drawings, the Contractor shall furnish and install all piping appurtenances, such as gate valves, special valves, valve boxes, Y's, tees, crosses, bends, sweeps, etc.

All plugs, caps, tees, bends, and other fittings shall be provided with adequate thrust blocks. Thrust blocks shall be constructed to the minimum dimensions shown on the drawings or as directed. Thrust Blocks shall be made of concrete having a compressive strength of 28 days of 3000 psi and shall bear directly against the undisturbed trench wall. Where possible, the backing shall be so placed that the fitting joints will be accessible for repair. All bolts and pipe joints shall be protected against contact with thrust block concrete by the installation of a polyethylene film placed between the fittings and the poured concrete. Where any section of a main is provided with concrete thrust blocks, the hydrostatic pressure test shall not be made until three days after installation of the concrete thrust blocks unless otherwise approved by the Engineer.

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 Specification C 39 or C 42. Sakrete or any similar material will not be permitted under any circumstances.

Where trench conditions are, in the opinion of the Engineer, unsuitable for thrust blocks, the Contractor shall provide steel tie rods to adequately anchor the piping. In addition, all fittings, hydrants, valves, etc., located within ten feet of another fitting, hydrant, valve, etc., shall be joined using steel tie rods and eye bolts. All tie rods shall be given a bituminous protective coating or shall be galvanized.

Concrete for thrust blocks, polyethylene, tie rods, etc., are considered incidental to pipe line construction and are to be included in the linear foot unit cost of the pipe. No additional payment will be made.

### 3.4 MAXIMUM PERMISSIBLE DEFLECTIONS

Maximum permissible deflections per joint per 18-foot length of mechanical joint pipe is as follows:

- 2" - 31 inches
- 3" - 31 inches
- 4" - 31 inches
- 6" - 27 inches
- 8" - 20 inches

Deflection for lengths lessor or greater then the above are proportionate.

The maximum deflection permitted for "push-on" type joints are as follows, based upon 18-foot length:

- 4" through 12" - 19 inches
- 14" through 16" - 15 inches
- 18" through 24" - 11 inches

The maximum deflection per joint of flexible joint pipe shall be that deflection recommended by the manufacturer.

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### **3.5 BACKFILLING**

The initial backfill shall be carefully placed to a level 12 inches over the top of the pipe. This backfill shall be excavated soil free from debris, organic material and large rock and stones. Initial backfill is to be deposited uniformly on both sides of the pipe so as to insure adequate stability of the installed pipe. Initial backfill shall be compacted so that the material fills and supports the haunch area and encases the pipe to the limits shown on the trench cross sections on the Contract Drawings.

The initial backfill shall be placed in layers not to exceed 6 inches loose and compacted to 95% of the maximum dry density as determined by the Standard Proctor test. From the bottom of the trench to the centerline of the pipe the backfill material shall be compacted by approved hand tamps. From the centerline of the pipe to the top of the initial backfill, other mechanical tamps as approved by the Engineer may be used.

Final backfill for pipelines shall be defined as that portion of the trench from an imaginary line drawn 12 inches above the top of the pipe to the original ground surface. Final backfill will be done with suitable excavated material. Debris, material not given to adequate compaction, and stone over one cubic foot will not be allowed within the trench limits. If material excavated is not suitable for backfilling, the Contractor shall, at no increased cost to the Owner, remove and dispose of such unsatisfactory material and shall backfill the trench with suitable material obtained elsewhere.

Where pipelines installed within the ditch to ditch limits of any roadway, driveway or parking area etc., final backfill shall be compacted to a minimum dry density of 95 percent of the maximum dry density in pounds per cubic foot as determined by the Standard Proctor Compaction Test.

Backfill material shall be placed in 6 inch layers and thoroughly tamped or rolled to the required degree of compaction by sheepsfoot or pneumatic rollers, mechanical tampers, vibrators, etc. Successive layers shall not be placed until the layer under construction has been thoroughly compacted.

In areas outside the ditch to ditch limits of a roadway, driveway, parking areas, etc., backfill shall be compacted in a satisfactory method. Any settlement shall be immediately corrected.

Heavy equipment shall not be operated over any pipe until it has been properly backfilled and has a minimum cover of 24 inches. Where any part of the required cover is above the proposed finish grade, the Contractor shall place, maintain, and finally remove such material at no cost to the Owner. Pipe which becomes misaligned, shows excessive settlement, or has been otherwise damaged by the Contractor's operations shall be removed and replaced by the Contractor at no cost to the Owner.

The Contractor shall maintain all pipes installed in a condition that they will function continuously from the time the pipe is installed until the project is accepted.

### **3.6 GATE VALVE INSTALLATION**

Before setting each valve the Contractor shall make sure the interior is clean and test opening and closing. Valves shall be set with stems plumb, unless horizontal installation is called for on the plans, and at the exact locations shown. Trench backfill shall be tamped thoroughly for a distance of three feet on each side of valve boxes.

### **3.7 GATE VALVE BOX INSTALLATION**

A valve box shall be installed over each underground valve. All boxes shall be set plumb with their top flush with finished grade.



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### **3.8 TRACER TAPE INSTALLATION**

The Contractor shall install a metallic tracer tape capable of being detected by a standard metal detector a minimum of 12" directly above any non-metallic pipe installed under this Contract.

**END OF SECTION**

## LINCOLN TON EQUIPMENT SHOP

# SECTION 02100 – ROCK EXCAVATION

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section
- B. Earthwork 02300.

### 1.2 DESCRIPTION OF WORK

- A. The work covered by this section consists of the blasting and excavation of rock material in cut areas.
- B. Rock excavation shall be defined as the removal of a formation that cannot be excavated without systematic drilling and blasting or other unusual methods such as the use of a rock breaker or expansion grout. In contrast, normal or earth excavation is a formation that, when plowed or ripped, breaks down into small enough pieces to be easily removed and can be loaded into hauling units. In order to prove that the material should be classified as rock excavation, the Contractor is to provide a demonstration that the material cannot be removed with a D-9 dozer equipped with a single tooth ripper. The Contractor may be required to provide equipment specification data verifying that the above minimum-rated equipment will be used for demonstration purposes. The equipment is to be in good repair and in proper working condition. The Architect is to be the final judge as to what is to be classified as rock excavation.

### 1.3 BASIS OF PAYMENT

- A. Payment shall be in accordance with the “Unit Prices” section in Division 1.

The cost for rock excavation shall be paid for at the unit bid price per cubic yard, under:

“Trench Rock” or “Bulk Rock”

Trench rock shall be defined as that rock required to be removed from trenches for all pipes less than 48” in diameter as well as for catch basins, and for footing excavations less than or equal to 48”.

Bulk rock shall be defined as all other rock required to be removed.

The unit price payment will be the only compensation for all costs associated with removal of rock, including but not limited to, breaking, removal, disposal off site, surveying, permit fees (if applicable), and replacement with suitable fill.

## PART 2 – PRODUCTS

### 2.1 GENERAL

- A. All explosives shall comply with applicable codes and shall be suitable for removing rock in small quantities at a time such that adjacent properties are not affected.

## PART 3 – EXECUTION

### 3.1 CONSTRUCTION REQUIREMENTS

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- A. Blasting – The use of explosives shall be in strict accordance with all Federal, State, County, and local regulations and only, after the approval of the Architect. Contractor shall provide vibration monitoring or any other requirements of such permits, if applicable. The Contractor, in addition to any requirements of permits, shall videotape all structures within 500 feet.
- B. When rock is encountered, all lines and grades will be held in accordance with the plans or adjusted only after approval of the Architect.
- C. When rock is encountered within the limits of construction the Contractor shall notify the Architect. The Contractor is to expose and clean the rock material for inspection. If rock is determined by Architect to qualify for payment as “rock excavation”, then the Contractor shall grade earth on all sides of the rock, as much as possible, to finish grades required. If requested by Architect, the Contractor shall employ a professional surveyor to measure the quantity of rock using cross sections and the average-end area calculation method. In this case, the surveyors calculated volume shall be used for payment. Otherwise, the measurement shall be determined by the Architect and reviewed by the Contractor. Any rock removed from its original location prior to authorization by Architect or prior to review of measurements by Architect will not be eligible for payment.

**END OF SECTION**

# LINCOLN TON EQUIPMENT SHOP

## SECTION 02300 - EARTHWORK

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.
- B. Section 02100 Rock Excavation
- C. Section 01200 Unit Prices

#### 1.2 DESCRIPTION OF WORK

This section covers the rough and fine grading of the site, including excavating and filling operations of earth.

#### 1.3 SUBMITTALS

Submit three (3) copies of all soil testing results to Architect.

#### 1.4 QUALITY ASSURANCE

A. Inspection, Testing, and Compaction  
Owner will employ, at his expense, an independent testing agency to assure quality of site preparation, fill placement, footing bottoms, and compaction. These special inspections are listed in Section 01400. All such special inspections shall be coordinated by the Contractor to avoid delays.

Compacted earth shall be tested by a geotechnical engineering firm paid for by the Owner. Tests shall be made for each 12-inch depth of fill at a minimum rate of one per 5,000 square feet. A minimum of one test per separate fill area shall be performed, i.e., non-contiguous areas of fill may not be combined to compute an average of one test per 5,000 square feet. Tests shall be for density and moisture content.

All fill areas (except the waste area) shall be compacted to at least 95% of maximum dry density at optimum moisture content as determined by the Standard Proctor Test, ASTM D698, except that landscaped areas greater than 10 feet from pavements or structures may be as low as 90%. In addition, the top 12-inches of fill areas below any pavements, curbs, walks, foundations, or slabs shall be compacted to at least 100% of maximum dry density at optimum moisture content. Inadequately compacted areas shall be corrected by Contractor and retested at Contractor's expense until results are compliant with this specification. Excavated areas under structures shall also be tested for density at a rate of one test per 2,500 square feet. Backfilled trenches shall also be tested at a rate of one test per 100 linear feet per trench. In addition to laboratory testing, all areas shall be proofrolled in the presence of the Architect or his representative and any areas that have visible "pumping" action or excessive deflection shall be corrected. Proofrolling shall be performed on both cut and fill areas at final grade and on original ground just prior to filling. Proofrolling shall consist of overlapping passes in two perpendicular directions. The Contractor shall provide a fully loaded tandem axle dump truck for proofrolling (20 ton minimum rear axle weight).

### PART 2 – PRODUCTS

#### 2.1 EARTH FILL

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Earth used as fill material shall be obtained on site as required to bring the site to final grade. If insufficient quantities of suitable earth are available on site, the Contractor shall obtain elsewhere at his expense. (If excess material is excavated than cannot be properly placed on the site, then the Contractor shall remove from the site at his expense.) All such material, regardless of where obtained, must be suitable for structural fill unless otherwise authorized by the Architect. To be suitable as structural fill, the earth must be free of organic matter (stumps, roots, sod, topsoil, and the like), frozen material, rocks larger than 4-inch, and any trash or debris. The top 12-inches of fill shall be free of any material that will not pass a 3-inch sieve. The fill material shall have a maximum dry density of at least 90 lbs. per cubic foot. Also, the earth must be near the optimum moisture content, as determined by the independent testing agency, to achieve satisfactory compaction (generally within 5% of optimum). The Contractor shall add water if material is too dry. Material that is too wet shall not be used until it dries to acceptable moisture content. Contractor shall spread and disc material, or use other techniques, to facilitate drying as may be necessary to achieve the optimum moisture content.

### 2.2 PIPE BEDDING OR EMBEDMENT MATERIAL

Native material suitable as fill, but where stone bedding is indicated or required it shall be crushed stone conforming to ASTM D488/AASHTO M-43, size no.67.

### 2.3 EXCAVATION CLASSIFICATION

Earth excavation shall be classified into the following three categories unless otherwise specified elsewhere in the Contract Documents.

- A. Normal Excavation: All excavation not classified as "rock excavation" or "undercutting" shall be classified as "normal excavation".
- B. Rock Excavation: Material which requires explosives or other unusual means to be excavated shall be classified as "rock excavation". This is further defined in Section 02100.
- C. Undercutting: Material that must be removed in order to reach suitable material (up to 3 feet below subgrade) shall be classified as "undercutting". This generally will be excessively wet soil, organic soil, or expansive clay. Any other material deemed unsuitable by the Architect or by the independent testing agency shall also be undercut and removed. Only material that must be removed in order to support foundations, pavements, embankments, and the like shall be classified as "undercutting". Material which is to be removed as part of the grading plan and which happens to also be "unsuitable" shall not be classified as "undercutting". All material the Contractor desires to be paid for as "undercutting" must be reviewed by the Architect prior to excavation in order to qualify for payment. It is the Contractor's responsibility to notify the Architect for this purpose. The unit price bid for undercutting shall be for removal of unsuitable material to not greater than 3 feet below design subgrade, and shall include all costs associated with disposal, finding suitable material, and placing suitable material.

Unless earthwork has been bid under classifications, then no separate payment will be made for "rock excavation" or "undercutting".

## PART 3 - EXECUTION

### 3.1 CLEARING AND GRUBBING

Prior to grading the site, all areas to be graded shall be cleared of all trees, shrubs, brush, and all other vegetation including stumps, roots, and sod, except that any trees designated on the plans to be saved shall be protected. Areas which are not to be cut or filled but will have pavements or structures located on them shall also be cleared and grubbed. Grubbing shall be complete

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leaving no part of the stumps or roots left in place. All topsoil shall be stripped from the original ground surface and stockpiled separately for use in landscaped areas after final grading. Cut trees, brush, and stumps shall be removed from the site, or burned on site if permitted by local codes, or ground into mulch and spread in natural areas (or in proposed landscaped areas if allowed by the landscaping plans). No such matter shall be buried or left on site unless specifically indicated on plans or otherwise authorized by Architect.

The Contractor shall layout the limits of clearing based on the plans and shall use all means necessary to protect adjacent properties. No equipment or personnel shall enter adjacent properties unless temporary easements or equivalent permission have been obtained.

### 3.2 SURVEYING

The Contractor shall provide all construction surveying necessary to establish the final grades indicated on the plans. Sufficient benchmarks and horizontal line (typically property line) markers will be provided by the Owner from which the Contractor can layout the project dimensions and elevations.

### 3.3 GRADING, GENERAL

All areas shall be graded as indicated on the plans with uniform slopes between indicated elevations (whether contours or spot elevations), except that significant changes in slope shall be rounded at the point of change. In the absence of direction on the plans or by the Architect, always grade earth to slope away from structures and to collect surface water at logical points such as storm drain inlets, curbs, swales, and the like. Prior to reaching final design grades, positive drainage shall be maintained in order to prevent ponding of water on any exposed subgrades.

### 3.4 EXCAVATION

Earth shall be excavated as required to establish the grades and dimensions indicated on the plans and as required to allow the later construction of foundations, slabs, pavements, walks, or other improvements. The bottom of all excavations shall be firm and relatively dry. Any excessively wet, organic, or otherwise unsuitable soil revealed at the bottom of an excavation shall be undercut to suitable material unless otherwise directed by the Architect. Undercut areas shall be brought back up to design elevation with compacted earth per these specifications, compacted ABC stone, or concrete.

Cut and fill slopes shall generally not be steeper than 2.5 horizontal to 1 vertical, unless otherwise indicated on the plans.

Foundation cut areas shall be protected from water and freezing during the time between excavation and pouring of concrete. The time between excavating a foundation area and pouring the concrete shall be minimized as much as possible. All foundation and slab area excavations must be inspected by the Architect and by the local building official prior to pouring any concrete.

Where rock is encountered in foundation areas, it shall be cut clean at sides and bottom of footing. No loose or fractured rock shall be left in place. When thus properly prepared, the remaining rock may serve as forms for the concrete. Likewise, excavated earth faces (vertical) may be used in lieu of constructed forms if the earth is sufficiently firm and uniform, unless otherwise specified on the structural plans or specifications. Step-downs in footing trenches shall be no steeper than 2 horizontal to 1 vertical, unless excavated in rock.

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Where water is encountered in excavated areas it must be kept pumped out, whether groundwater or stormwater. Where groundwater is encountered the Architect shall be notified to review the situation.

The Contractor will not receive any additional or separate payment for unauthorized or excessive excavations, nor for excavations required to accommodate forms, pumps, temporary structures, or other items that may be necessary as part of the total project. All such "additional" excavations shall be filled back in with compacted earth or stone, or with concrete, in accordance with this specification.

Protect all existing underground utilities or other structures to remain during excavation operations.

### 3.5 FILL

Except as otherwise specified, earth foundation surfaces shall be graded to remove surface irregularities and shall be scarified parallel to the axis of the fill or otherwise acceptably scored and loosened material to a minimum depth of 2 inches. The moisture content of the loosened material shall be controlled as specified for the earth fill, and the surface materials of the foundation shall be compacted and bonded with the first layer of earth fill.

Where embankments are to be placed and compacted on hillsides, or when new embankment is to be compacted against existing embankments, or when embankment is built in part widths, and the slopes are steeper than 4:1, then benches shall be cut in the existing ground. For slopes of 4:1 or flatter, the original ground shall be loosened and scarified to a depth of 6-inches.

The material shall be deposited and spread in successive, uniform, approximately horizontal layers of not more than 8-inches in depth, loose measurement, for the full width of the cross section, and shall be kept approximately level by the use of effective spreading equipment. Each layer of the fill shall be thoroughly compacted as herein specified. The full width of the fill shall be properly drained at all times. The waste area fill shall conform to these measures and methods, except that layers may be up to 12-inches in depth and 90% compaction will not be required.

Fill shall not be placed upon a frozen surface, nor shall snow, ice, or frozen material be incorporated in the fill.

All fill material shall be compacted as specified herein unless otherwise provided in the Contract or directed by the Architect. Compaction equipment used by the Contractor shall be adequate to produce the required compaction and produce a uniformly constructed fill with all layers uniformly bound to all preceding layers.

Fill materials shall be compacted at a moisture content satisfactory to the Architect, which shall be approximately that required to produce the maximum density. The Contractor shall dry or add moisture to the fill material when required to produce a uniformly compacted and stable fill.

Water may be applied by sprinkling the materials after placement on fill, if necessary. Uniform moisture distribution shall be obtained by discing, blading, or other approved methods prior to compaction of the layer.

Fill placed at densities lower than the minimum acceptable density or at moisture contents outside the acceptable range of moisture content or otherwise not conforming to the requirements of the specifications shall be reworked to meet the requirements or removed and replaced by acceptable fill. The replacement fill and the foundation abutment and fill surfaces upon which it is placed shall conform to all requirements of this specification for foundation preparation, approval, placement, moisture control and compaction.

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### 3.6 FINAL GRADING

When pavements, walks, structures, and other improvements are complete, prepare remaining areas for grassing or other landscaping by loosening the top 6-inches of soil and grading to remove any depressions and irregularities. Remove all stones greater than 2", wood, rubbish, or other undesirable material in the top 6-inches. Incorporate any available topsoil at this time. After this preparation, no equipment shall be allowed on these areas, other than what is necessary for grassing and/or landscaping, for the remainder of the project.

### 3.7 EROSION CONTROL

The Contractor shall control erosion and shall prevent off-site sedimentation throughout the life of the project, in accordance with the instructions on the plans. All disturbed areas not being actively worked on for more than two weeks shall be temporarily or permanently revegetated.

### 3.8 TRENCH WORK

#### A. Protection

Worker and property protection: References to sheeting and trench shields below are with regard to their relation to the pipe installation. The Contractor is responsible at all times for providing protection in compliance with all laws and regulations, whether by moveable trench shields or other means. The Architect will not direct the Contractor in the use of any protection. However the Owner reserves the right to stop work due to Contractor disregarding laws and regulation. The Contractor shall use all necessary means to protect personal, public and private property, structures, utilities etc.

#### B. Horizontal and Vertical Control

The Contractor shall establish all locations, lines, grades and elevations as required to install the pipeline as indicated on the drawings, based on whatever horizontal and vertical control is given however limited. A land surveyor shall be employed if necessary. Do not begin excavation when the ground is frozen.

#### C. Trench Excavation

##### 1. Dimensions

Trenches shall be excavated to the width and depth indicated on the drawings and typical sections. Trench bottoms shall have a uniform slope when indicated and shall conform to the horizontal alignment shown. The sides of the trenches shall be as nearly vertical as possible. Minimum depth of the trench shall be as required to achieve 36 inches cover over the top of the pipe, unless otherwise noted.

##### 2. Sheeting and Bracing

If trench sides are not stable due to the soil type then they may be sloped back at an angle necessary for stability, or sheeting and/or bracing shall be used. The width of a trench shall be as narrow as possible as measured at the bottom just above the pipe crown (maximum of 12 inches between outside diameter and side walls), unless wider width is required due to trench shields, sheeting, or to accommodate compaction equipment. Above the crown of the pipe the trench width may be wider. The trench must be wide enough to accommodate compaction material on each side of the pipe.

##### 3. Movable Trench Shields

Where movable trench shields are used, a narrow sub ditch shall be excavated below the bottom of the shield such that the 12 inches limit each side of the pipe is achieved. The sub ditch shall have a depth equal to the pipe outside diameter plus any bedding material. The use of a sub ditch when using a moveable trench shield may be omitted if permitted by the Architect. In that case, the soil on each side of the pipe must be compacted in accordance with Part 3.5 after the



## LINCOLN TON EQUIPMENT SHOP

shield is removed. Pipe bedding, pipe location and pipe joints must not be disturbed when moving the trench shields.

### 4. Sheeting

Whenever necessary to protect adjacent property, structures, pavement or any existing facilities, sheeting and bracing shall be installed to support trench walls and to prevent lateral soil movement. The method and design of sheeting and bracing is the contractor's responsibility and the contractor is responsible for the protection of all such adjacent improvements from the excavation process. If in place sheeting and bracing is used for any reason, it must be used in a manner that protects the integrity of the pipe installation. Such sheeting shall be left in place from 2 feet above the top of the pipe to the bottom of the sheeting. Sheeting above 2 feet above the pipe may be cut and removed. Sheeting must be removed to a depth of at least 3 feet below finished ground surface, as long as there remains 2 feet above the pipe. The bedding and initial backfill for the pipe shall not be disturbed during removal of sheeting.

### 5. Over Excavation

Where the bottom of the trench is excavated deeper than necessary, whether due to poor foundation conditions requiring undercutting or due to contractor error, suitable material shall be placed in 6 inch layers up to the specified grade for the pipe. Each layer shall be compacted to achieve 95% Standard Proctor maximum density.

### 6. Rock

Where rock is encountered during excavation, it must be removed using any effective, safe, and legal means available, such as the use of explosives. It shall be removed to achieve the minimum trench dimensions required plus an additional 6 inches below the pipe (or below any bedding specified). Approved material shall be used to bring the trench bottom back up to design grade. The trench width may be reduced, if approved by Architect, to a minimum clearance of 6 inches on each side of the pipe. In this case, crushed stone, or hand compaction of other approved materials will be required for bedding and haunching. The specified 6 inches additional depth and 6 inches minimum side clearance shall be maintained from the outside edge of all pipe bells, fittings and appurtenances.

Excavated rock may not be used as backfill material, unless it is crushed to meet the requirements for backfill as given in this Section. The Contractor shall dispose of all rock that is not suitable for backfill.

The use of explosives and any other means of removal shall comply with all applicable laws and ordinances. The Architect will not direct Contractor in this regard.

Unless otherwise specified, there will be no compensation to the Contractor for rock excavation in addition to the lump sum or unit price bid for pipe laying. If a bid price for rock excavation has been included in the contract, then the payment for rock excavation shall be made for the number of cubic yards removed, based on the definition of rock and of the quantity given in these specifications. In order for rock to qualify for additional payment, it must be demonstrated to the Architect that the material can not be removed by backhoe, power shovel, or any means normally used in the excavation of trenches and that the material can only be removed by the use of explosives or jack hammers. The Contractor shall clean all rock for inspection by Architect and shall submit measurements and wait for the Architect's approval prior to excavating. Otherwise additional payment will not be made. The measurement for rock payment shall be limited to the minimum clearances and under cutting required, as described above, regardless of actual quantity removed. The contractor is responsible for all damage that may result from the use of explosives. Proper warning devices, flagmen and protective coverings shall be used whenever blasting. The Contractor shall employ or subcontract experienced qualified personnel for all blasting.

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### 7. Water

Whenever ground water is encountered in the trench, it shall be removed by pumping to maintain a suitable pipe foundation and safe working conditions. The contractor shall provide all necessary pumps and appurtenances for this purpose. All visible standing or running water must be removed from the trench prior to the placement of bedding and pipe. If the trench bottom is, in the opinion of the Architect, unsuitable due to wetness, it shall be undercut and backfilled in accordance with Section 3.8D.

The discharge of ground water shall be in accordance with all applicable laws and ordinances. Turbid water shall be filtered or shall be discharged to a temporary sediment trap. There will be no separate payment to the contractor for dewatering.

### D. Unsuitable Foundation

Where unsuitable foundation conditions are encountered in the trench (such as highly organic material, very soft earth, or excessive wetness), then the material encountered shall be undercut and back filled. Under cutting depth below the design grade shall be as directed by the Architect but shall generally be 12 inches. Backfill material shall be crushed stone. Other select material may be used only if approved by the Architect prior to placement. The backfill material shall be compacted up to the design grade for the trench bottom. There will be no separate payment for under cutting and back filling unless otherwise specified. If payment is specified, it shall be for the number of cubic yards of crushed stone placed. The unit price, if any, shall include all costs involved including under cutting, backfill, and disposal of unsuitable material.

**END OF SECTION**

## SECTION 02350 – EROSION AND SEDIMENT CONTROL

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.
- B. Section 02300 Earthwork

#### 1.2 DESCRIPTION OF WORK

This section covers the construction, installation, maintenance and removal of all erosion and sediment control devices.

#### 1.3 EROSION AND SEDIMENT CONTROL DELEGATION OF AUTHORITY

The NC Department of Transportation has been delegated authority for erosion and sediment control inspection and plan approval. The contract work related to erosion and sedimentation control will adhere to the standard specification and drawing of the NCDOT Standard Specification for Road and Structures (July 2006). Any reference to Method of Measurement, Basis of Payment or any other statement regarding direct payment for Erosion and Sediment Control measures shall be disregarded. If determined by the Engineer, Architect or either of their representatives, that significant erosion or sedimentation is occurring, despite the proper installation of approved protective measures, then the contractor will be required to take additional protective action.

#### 1.4 EROSION AND SEDIMENT CONTROL/STORMWATER CERTIFICATION

- A. 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 Pollutant Discharge Elimination System (NPDES) permit for the work is required.
- B. 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.
  - 1. Certified Supervisor – Provide a certified Erosion & Sediment Control Stormwater Supervisor to manage the Contractor and subcontractor(s) operations, insure compliance with Federal, State and Local ordinances and regulations, and to manage the Quality Control Program.
  - 2. 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.
  - 3. Certified Installer – Provide a certified installer to install or direct the installation for erosion or sediment/stormwater control practices.
  - 4. 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.
- C. Roles and Responsibilities
  - 1. Certified Erosion & Sediment Control Stormwater Supervisor - The Certified Supervisor shall be responsible for ensuring erosion and sediment/stormwater control is adequately implemented and maintained on the project and conducting the quality control program. The Certified Supervisor shall be on the project within 24 hours from initial exposure of an

## LINCOLN TON EQUIPMENT SHOP

erodible surface to the project's final acceptance when questions or concerns arise with Erosion and Sedimentation Control/Stormwater issues. Perform the following duties:

- a. Manage Operations - Coordinate and schedule the work of subcontractors so that erosion and sediment/stormwater control measures are fully executed for each operation and in a timely manner over the duration of the contract.
  1. Oversee the work of subcontractors so that appropriate erosion and sediment/stormwater control preventive measures are conformed to at each stage of the work.
  2. Prepare the required weekly erosion control punchlist and submit to the Engineer.
  3. Attend all weekly or monthly construction meetings to discuss the findings of the NPDES inspection and other related issues.
  4. Implement the erosion and sediment/stormwater control site plans requested.
  5. Provide for erosion and sediment/stormwater control methods 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.
  6. Acquire applicable permits and comply with requirements for borrow pits, dewatering, and any temporary work conducted by the Contractor in jurisdictional areas.
  7. Conduct all erosion and sediment/stormwater control work in a timely and workmanlike manner.
  8. Fully install erosion and sediment/stormwater control work prior to suspension of the work.
  9. Coordinate with Department, Federal, State and Local Regulatory agencies on resolution of erosion and sediment/stormwater control issues due to the Contractor's operations.
  10. Ensure that proper cleanup occurs from vehicle tracking on paved surfaces and/or any location where sediment leaves the Right-of-Way.
  11. Have available a set of erosion control plans that has been 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 permit 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 E&SC Program. 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. construction materials, concrete washout, chemicals, litter, fuels, lubricants, coolants, hydraulic fluids, any other petroleum products, and sanitary waste).
  - b. Inspect E&SC/Stormwater devices at least once every 7 calendar days, twice weekly for 303(d) impaired streams, and within 24 hours after a significant rainfall event of 0.5 inches within 24 hours.
  - c. Maintain an onsite rain gauge and a record of rainfall amounts and dates.
  - d. Maintain E&SC/Stormwater inspection records for review by Department and Regulatory personnel upon request.
  - e. Implement approved reclamation plans on all borrow pits and waste sites.
  - 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 E&SC/Stormwater awareness, the NPDES Permit requirements, and the requirements of the General Permit, NCG010000.
  - i. Report violations of the NPDES permit to the Engineer who will notify the DWQ Regional Office within 24 hours.
3. Quality Control Program - Maintain a quality control program to control erosion, prevent sedimentation and follow provisions 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/or subcontractor(s) on site have the proper erosion and sediment/stormwater control certification.

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- c. Notify the Engineer when the required certified erosion and sediment/stormwater control 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. 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.
  - f. Maintain temporary erosion and sediment control devices.
  - g. Remove temporary erosion or sediment control devices when they are no longer necessary as agreed upon by the Engineer.
  - h. 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.
  4. 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:
    - a. Foreman in charge of grading activities
    - b. Foreman in charge of bridge or culvert construction over jurisdictional areas
    - c. Foreman in charge of utility activities
  5. 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.
  6. 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.
  7. Certified Installers - Provide at least one onsite, Level I Certified Installer for each of the following erosion or sediment/stormwater control crew:
    - a. Seeding and Mulching
    - b. Temporary Seeding
    - c. Temporary Mulching
    - d. Sodding
    - e. Silt fence or other perimeter erosion/sediment control device installations
    - f. Erosion control blanket installation
    - g. Hydraulic tackifier installation
    - h. Turbidity curtain installation
    - i. Rock ditch check/sediment dam installation
    - j. Ditch liner/matting installation
    - k. Inlet protection
    - l. Riprap placement
    - m. Stormwater BMP installations (such as but not limited to level spreaders, retention/detention devices)
    - n. Pipe installations within jurisdictional areas
  8. If a Certified Installer is not onsite, the Contractor may substitute a Level I Installer with a Level II Foreman, provided the Level II Foreman is not tasked to another crew requiring Level II Foreman oversight.
  9. 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.
- D. Preconstruction Meeting
- Furnish the names of the Certified Erosion & 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.

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### E. 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.

### F. Revocation or Suspension of Certification

1. Upon recommendation of the Chief Engineer - Operations to the certification entity, certification for Supervisor, Certified Foremen, Certified Installers and Certified Designer may be revoked or suspended with the issuance of a Continuing Immediate Corrective Action (Continuing ICA), Notice of Violation, or Cease and Desist Order for erosion and sediment control/stormwater related issues.
2. Should any of the following circumstances occur, the Chief Engineer may suspend or permanently revoke such certification.
  - a. Failure to adequately perform the duties as defined within the certification program
  - b. Issuance of a continuing 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 within another state
3. Suspension or revocation of a certification will be sent by certified mail to the registrant and the Corporate Head of the company that employs the registrant.
4. A registrant 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 - Operations  
1537 Mail Service Center  
Raleigh, NC 27699-1537

5. 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 registrant will not be allowed to perform duties associated with the certification during the appeal process.
6. 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 registrant.
7. If a certification is temporarily suspended, the registrant shall pass any applicable written examination and any proficiency examination, at the conclusion of the specified suspension period, prior to having the certification reinstated.

**END OF SECTION**

## SECTION 02361 - SOIL TREATMENT FOR TERMITE CONTROL

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Chemical soil treatment.

#### 1.02 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.
- C. Manufacturer's Certificate: Certify that toxicants meet or exceed specified requirements.
- D. Warranty: Submit warranty and ensure that forms have been completed in NC Department of Transportation's name.

#### 1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing this type of work and:
  - 1. Having minimum of 2 years documented experience.
  - 2. Approved by manufacturer of treatment materials.
  - 3. Licensed in North Carolina.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Toxicant Chemical: Dept. of Agriculture and Consumer Services, Pest Control Division and EPA approved; synthetically color dyed to permit visual identification of treated soil.

### PART 3 EXECUTION

#### 3.01 APPLICATION

- A. Spray apply toxicant in accordance with manufacturer's instructions.
- B. Apply toxicant at following locations:
  - 1. Under Slabs-on-Grade.
  - 2. At Both Sides of Foundation Surface.
- C. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- D. Re-treat disturbed treated soil with same toxicant as original treatment.
- E. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

#### 3.02 PROTECTION OF FINISHED WORK

- A. Do not permit soil grading over treated work.

### END OF SECTION

## SECTION 02440--AGGREGATE BASE COURSE

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and Division 1 Specification Sections, apply to this section.
- B. NCDOT Standard Specifications for Roads and Structures, July 2006, Division 10.

#### 1.2 DESCRIPTION OF WORK

The work covered by this section consists of the construction of a base composed of an approved aggregate material hauled to the site, placed on the site, compacted, and shaped to conform to the lines, grades, depths, and typical sections shown on the plans or established by the Architect.

#### 1.3 SUBMITTALS

- A. Product Data – Source of material and proof of participation in NCDOT's Aggregate QC/QA Program

#### 1.4 QUALITY ASSURANCE

- A. Owner will use independent testing agency to confirm base thickness and compaction.

### PART 2 – PRODUCTS

#### 2.1 MATERIALS

- A. Aggregate base course materials shall consist of crushed stone or uncrushed gravel, or other similar material having hard, strong, durable particles free of adherent coatings.

The Contractor shall furnish aggregate base course material produced in accordance with the requirements indicated herein.

All aggregates shall be from approved sources. Sources will not be approved unless the material has satisfactory soundness and satisfactory resistance to abrasion.

- B. Aggregates shall be handled in such a manner as to minimize segregation.

Sites for aggregate stockpiles shall be grubbed and cleaned prior to storing aggregates, and the ground surface shall be firm, smooth, and well drained. A cover of at least three (3) inches of aggregate shall be maintained over the ground surface in order to avoid the inclusion of soil or foreign material. Stockpiles shall be built in such a manner as to minimize segregation. When it is necessary to operate trucks or other equipment on a stockpile in the process of building the stockpile, it shall be done in a manner approved by the Architect.

Stockpiles of different types or sizes of aggregates shall be spaced far enough apart, or else separated by suitable walls or partitions, to prevent the mixing of the aggregates.

Any method of stockpiling aggregates which allows the stockpile to become contaminated with foreign matter or causes excessive degradation of the aggregate will not be permitted. Excessive degradation will be determined by sieve tests of samples taken from any portion of the stockpile



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over which equipment has been operated, and failure of such samples to meet all grading requirements for the aggregate will be considered cause for discontinuance of such stockpiling procedure.

- C. Gradation. All standard sizes of aggregates shall meet the gradation requirements when tested in accordance with Division 10 of the NCDOT Standard Specifications for Type ABC.

## PART 3 – EXECUTION

### 3.1 HAULING AND PLACING AGGREGATE BASE MATERIALS

The aggregate material shall be spread on the subgrade with a mechanical spreader capable of placing the material to a uniform loose depth and without segregation.

Where the required compacted thickness of base is 8 inches or less the base material may be spread and compacted in one layer. Where the required compacted thickness of base is more than 8 inches, the base material shall be spread and compacted in 2 or more approximately equal layers. The minimum compacted thickness of any one layer shall be approximately 4 inches.

Each layer of material shall have been sampled, tested, compacted and approved prior to placing succeeding layers of base material or pavement.

No base material shall be placed on frozen subgrade or base. Hauling equipment shall not be operated on subgrade or a previously completed layer of base material soft enough to rut or weave beneath the equipment.

The maximum speed of trucks hauling or traveling over any part of the subgrade or base is 5 miles per hour.

The Contractor shall utilize methods of handling, hauling, and placing which will minimize segregation and contamination. If segregation occurs, the Architect may require that changes be made in the Contractor's methods to minimize segregation, and may also require mixing on the road which may be necessary to correct any segregated material. No additional compensation will be allowed for the work of road mixing as may be required under this provision. Aggregate which is contaminated with foreign materials to the extent the base course will not adequately serve its intended use shall be removed and replaced by the Contractor at no additional cost to the Owner. The above requirements will be applicable regardless of the type of aggregate placed and regardless of prior acceptance.

### 3.2 TOLERANCES AND COMPACTION

After final shaping and compacting the base, the Architect will check the surface of the base for conformance to grade and typical section and will determine the base thickness.

The thickness of the base shall be within a tolerance of plus or minus ½ inch of the base thickness required by the plans.

The density of the final placed base shall be 100% of maximum.

### 3.3 MAINTANANCE

Where the base material is placed in a trench section, the Contractor shall provide adequate drainage through the shoulders to protect the subgrade and base until such time as shoulders are completed.

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The Contractor shall maintain the surface of the base by watering, machining, and rolling or dragging when necessary to prevent damage to the base by weather or traffic.

Where the base or subgrade is damaged, the Contractor shall repair the damaged area; reshape the base to the required lines, grade, and typical sections; and recompact the base to the required density at no cost to the Owner.

**END OF SECTION**

## LINCOLN TON EQUIPMENT SHOP

# SECTION 02450—ASPHALT CONCRETE PAVING

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.
- B. NCDOT Standard Specifications for Roads and Structures, July 2006, Divisions 6 and 10.

### 1.2 DESCRIPTION OF WORK

The work covered by this section consists of the production, delivery, and placement of all types of bituminous plant mixed bases and surface courses to the lines, grades, thickness, and typical sections shown on the Contract Drawings or established by the Architect.

### 1.3 SUBMITTALS

- A. Product Data—job mix source and proof of qualifications.

### 1.4 QUALITY ASSURANCE

- A. Asphalt Mix – Submittal shall be approved prior to delivery.
- B. Completed Pavement – Owner's independent testing agency will verify pavement thickness and density. Any areas found out of compliance with the specifications shall be replaced by Contractor.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

All materials used to produce the asphalt concrete mix shall meet the requirements of Division 10 of the NCDOT Standard Specifications.

### 2.2 COMPOSITION OF MIXTURES

The bituminous plant mix shall be composed of a mixture of aggregate, asphalt cement, and mineral filler when required. The several aggregate fractions shall be sized, uniformly graded, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula herein specified.

The job mix formula with the allowable tolerances shall be within the design limits specified for the particular type of bituminous mixture. The job mix formula for each mixture will establish a single percentage of asphalt cement to be added to the aggregate, and a single temperature at which the mixture is to be discharged from the plant.

The job mix formula shall be the type as specified on the Contract Drawings. In the absence of such specification, the type shall be Superpave S9.5B or RS9.5B. The mix shall conform to the requirements of Section 610 of the NCDOT Standard Specifications for Roads and Structures and shall be produced by an asphalt plant under the supervision of a certified NCDOT QMS technician.

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## PART 3 – EXECUTION

### 3.1 GENERAL

All paving operations shall conform with Section 610 of the NCDOT Standard Specifications and with Division 6 in general, as applicable, except that the field testing requirements of Section 609 will not be required. Quality assurance testing at the plant is required in accordance with Division 6.

### 3.2 WEATHER AND TEMPERATURE LIMITATIONS FOR PRODUCING AND PLACING BITUMINOUS MIXTURES

Bituminous mixtures shall not be produced or placed during rainy weather, when the subgrade or base course is frozen, or when the moisture on the surface to be paved would prevent proper bond. Bituminous material shall not be placed when the air temperature, measured in the shade away from artificial heat at the location of the paving operations, is less than the required temperatures in Section 610 of the NCDOT Standard Specifications.

### 3.3 SPREADING AND FINISHING

The bituminous mixture shall be spread and struck off to the required grades, cross sections, and thicknesses by self contained, power propelled pavers. The pavers shall be equipped with an activated screed or strike off assembly which is designed to be preheated, and shall have a sliding shoe attachment which will form a slope on the edge of the mixture which shall prevent edge raveling when the mixture is compacted.

A string line shall be placed by the Contractor for the first lane of each layer of mixture placed to provide alignment control for the paver, except that a string line will not be required when the first layer is placed adjacent to a curb section.

Roller used to compact the mixture shall be in good condition, capable of reversing with backlash. The rollers shall be operated with the drive wheels nearest the paver and at speeds slow enough to avoid displacement of the mixture. Steel wheel rollers shall be equipped with wetting devices to prevent the mixture from sticking to the roller wheels.

The number and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition.

Rolling for open-graded asphalt friction course shall consist of one coverage with a tandem steel wheel roller weighing a maximum of 10 tons, with additional rolling limited to one coverage with the roller where necessary to improve riding surface.

The use of rolling equipment with results in excessive crushing of the aggregate or excessive displacement of the mixture will not be permitted.

In areas inaccessible to equipment shall be thoroughly compacted by the use of hand tampers or hand operated mechanical tampers.

The tolerance of the final compacted pavement shall be 1/4-inch from the typical cross-sections shown on the plans.

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### 3.4 JOINTS

#### A. Transverse Joints:

When the laying of the mixture is to be suspended long enough to permit the mixture to become chilled, transverse joints shall be constructed. At the end of the days operation the Contractor shall construct a sloped wedge ahead of the end of the full depth pavement to provide for proper compaction and protection of the full depth pavement. When directed by the Architect, the contractor shall place a paper parting strip beneath this wedge to facilitate joint construction.

Before paving operations are resumed, the Contractor shall remove the sloped wedge and cut back into the previously constructed pavement shall then lightly coated with tackcoat.

When laying of the mixture is resumed at the joint, the construction of the joint shall be completed while the mixture is still in a workable condition.

#### B. Longitudinal Joints

Longitudinal joints shall be formed by allowing the paver to deposit the mixture adjacent to the joint to such depth that maximum compaction can be obtained along the joint. The joint shall be pinched by rolling immediately behind the paver.

When the multi-lane, multi-layer construction is required, the longitudinal joint in each lay shall be offset that in the layer immediately below by approximately 6-inches. The joint in to top layer shall be constructed, where possible, between design travel lanes.

### 3.5 SURFACE REQUIREMENTS

The surface of the plant mix base or pavement after compaction shall be smooth and true to the required cross sections and grade. Any defective areas shall be corrected with satisfactory, material, which shall be immediately compacted to conform with the surrounding area. Any area showing an excess of asphalt cement shall be removed and replaced.

The surface will be tested by the contractor in the presence of the Architect at all joints and at other selected locations using a 10-foot straightedge. The variation of the surface from the testing edge of the straightedge, when applied parallel to the centerline of the surface, shall not exceed 1/8-inch between any two contact points. Areas found to exceed this tolerance shall be corrected by the Contractor by removal of the defective work and replacement with new material unless other corrective measures are permitted by the Architect. The work and materials required in the correction of defective work shall be provided by the Contractor at no cost.

### 3.6 COMPACTION

All pavements shall be sufficiently compacted to achieve an average density of 95% of maximum. No area shall be accepted if less than 90%.

## END OF SECTION

# LINCOLN TON EQUIPMENT SHOP

## SECTION 02580--PAVEMENT MARKINGS

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section

#### 1.2 DESCRIPTION OF WORK

Work under this section consists of furnishing all labor, materials, equipment or layout, necessary for all pavement markings. The Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize flagmen, barricades, warning signs and warning lights as required.

### PART 2 – PRODUCTS

#### 2.1 PAINT TYPE

Paint shall be Sherwin-Williams "Pro-Mar" traffic marking paint, Series B29.Y.2, or Glidden traffic paint No. 63228.

The following items are to be painted with the colors noted below:

Handicap Symbols:	Per Local Code
Parking Stall Striping:	White

### PART 3 – EXECUTION

- A. Preparation: Sweep and clean surface to eliminate loose material and dust.
- B. Application: Apply two (2) coats of paint at manufacturer's recommended rate with total minimum of 15 mil dry film thickness.

Apply with mechanical equipment to provide uniform straightedges.

### END OF SECTION

## LINCOLN TON EQUIPMENT SHOP

# SECTION 02630--STORM DRAIN PIPE AND APPURTENANCES

## PART 1 – GENERAL

### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section
- B. Earthwork 2300

### 1.2 DESCRIPTION OF WORK

These specifications shall apply to the materials to be furnished and installed to complete the storm drainage installation in accordance with the plans. All pipe and appurtenances shall be of the class and type as indicated on the plans.

### 1.3 SUBMITTALS

- A. Product Data – Each type of pipe and structure.
- B. Shop Drawings – not required.

## PART 2 – PRODUCTS

### 2.1 GENERAL

All materials shall be first quality with smooth interior and exterior surfaces, free from cracks, blister, honeycombs, and other imperfections, and true to theoretical shapes and forms throughout. All materials shall be subject to the inspection of the Architect at the plant, trench, or other point of delivery, for the purpose of culling and rejecting material, which does not conform to the requirements of these specifications. Such material shall be marked by the Architect, and the Contractor shall remove it from the project site upon notice being received of its rejection.

As specific specifications are cited, the designation shall be construed to refer to the latest revision under the same specification number, or to superseding specifications under a new number, except provisions in revised specifications which are clearly inapplicable.

### 2.2 CORRUGATED STEEL PIPE (CSP)

12" to 36" diameter corrugated steel pipes shall be 14 gage with a 2-2/3" x 1/2" corrugation. The steel pipe, couplers, and fittings shall conform to the requirements of AASHTO M-36. The corrugated metal shall be manufactured with continuous lockseam and shall have no less than 3 annular corrugations rerolled at both ends of any length of pipe.

The coupling bands shall be a minimum of 12" wide with 3/8" thick x 12" wide neoprene gasket. Couplings shall be drawn together by the use of standard bolts and lugs. Gaskets shall be lubricated and shall be compressed by tightening the coupling band. Contractor is to ensure gaskets are lubricated and that the band "seats" into the rerolled corrugations of the pipe. All CSP bands are to be wrapped with a woven geotextile fabric, to extend at least 6" past each side of the band.

All pipe shall be fully asphalt-coated (Type A) or Type 2 aluminized.

## **LINCOLNTON EQUIPMENT SHOP**

All aluminized surfaces in contact with concrete shall be primed with one coat of zinc chromate primer.

### **2.3 REINFORCED CONCRETE PIPE**

All reinforced concrete pipe shall meet the requirements of ASTM C-76-Reinforced Concrete Culvert, Storm Drain and Sewer Pipe. Reinforced concrete pipe shall be Class III, Wall B or higher. Joints for reinforced concrete pipe storm drains shall be tongue and groove without O-rings. Joints shall be formed such that when the pipe is laid together, they will form a continuous and uniform line.

### **2.4 HIGH DENSITY POLYETHYLENE PIPE (HDPE)**

All HDPE pipe shall conform to the following standards as applicable: AASHTO M252 Type S and M 294 Type S, ASTM D1248 and D3350. Installation shall be in accordance with NCDOT standards and shall have No. 56 stone bedding up to the center of the pipe. The soil cover over the pipe shall not be less than one foot, and as recommended by the pipe manufacturer. All HDPE pipe shall have a corrugated exterior and a smooth interior. Coupling bands shall cover at least one full corrugation on each section of pipe. All coupling bands shall meet or exceed the soil-tightness requirement of the AASHTO standard specification for Highway Bridges, Section 23, and Paragraph 23.3.1.5.4 (e).

HDPE pipe may not be used for sizes greater than 24-inch diameter.

### **2.5 CATCH BASINS AND OUTLET CONTROL STRUCTURES**

Catch basins shall be precast concrete rated for HS20 wheel loads. Use structures conforming to NCDOT Standard No. 840.14 and 840.45. Provide transition sections and/or brick and mortar as required to fully support cast iron frames. The structure supplier (precaster) shall be fully responsible for the design of each structure, in accordance with ACI 318 for HS20 live loads. Grates, frames, and hoods shall be NCDOT standard no. 840.03, type E, F, or G as applicable.

## **PART 3 – EXECUTION**

### **3.1 GENERAL**

Pipe and structures shall be installed in accordance with the lines, grades, and elevations shown on the plans. Structures shall be installed plumb and carefully backfilled so as to prevent damage. Pipes shall be installed in straight lines between structures, with no curvature either horizontally or vertically. Follow all manufacturers' installation instructions on printed guides or manuals. Adjust final elevation of cast iron frames to match adjoining pavements. Grout all voids around pipes at connections to structures.

### **3.2 EXCAVATION, BACKFILLING, COMPACTION**

Refer to Section 02300.

### **3.3 CLEANING**

Remove accumulated soil, debris, or other matter from inside all pipe and structures prior to final acceptance by Owner. However, do not merely wash such matter downstream. It must be removed and properly disposed.

## **END OF SECTION**



# LINCOLN TON EQUIPMENT SHOP

## SECTION 02710 - FENCING

### PART 1 - GENERAL

This section shall include the chain link fence complete with all posts, gates, fabric, fabric ties, padlocks, and appurtenances. The fence shall be six feet high with top horizontal rail and bottom reinforcing wire. The fence shall be provided with three strands of barbed wire and shall have a total height of seven feet.

### PART 2 - PRODUCTS

#### 2.1 POSTS

All posts shall be of high carbon steel pipe having the weight and diameter as follows:

Top Rail	1-1/2" O.D. - 2.27 LBS/FT
Line Posts	2-1/2" O.D. - 3.65 LBS/FT
End and Corner Posts up to 6' wide	3" O.D. - 5.79 LBS/FT
Gate Posts for Gate Frames over 6' wide and up to and including 13'0" wide	4" O.D. - 9.11 LBS/FT
Gate Posts for Gate Frames over 13'0" wide and up to and including 18'0"	6-5/8" O.D. - 18.97 LBS/FT
Gate Posts for Gate Frames over 18'0"	8-5/8" O.D. - 14.70 LBS/FT

All posts shall have angled brackets above the top rail and shall have provisions for attaching three strands of barbed wire.

All posts shall be set in concrete footings which shall be not less than three feet deep. Footings shall be of Class B concrete. Footing for line posts shall be not less than 8-inches in diameter and footings for all other posts (including the footings for gate center stops) shall be not less than 12-inches in diameter.

Line posts shall be spaced uniformly, not more than ten feet apart.

#### 2.3 FABRIC AND TIES

Fabric shall be composed of Number 9 gauge steel wire woven in a two-inch mesh. Top and bottom edges shall have a twisted and barbed finish. Fabric ties shall be Number 6 gauge round aluminum and shall be spaced not more than 24 inches apart on the top rail, 14 inches apart on posts, and 24 inches on bottom wire.

Fabric shall conform to ASTM Designation A-117.

#### 2.4 GATE FRAMES

Gate frames shall be 2-inch standard steel pipe with internal bracing of 1 5/8-inch standard steel pipe and shall be welded at all points. Gate hinges and latches shall be of heavy malleable iron center stop and integral padlock eye. Provide a keeper for all vehicle gates which automatically engages the gate leaf and holds it in the open position until manually released. End members shall extend one foot above the horizontal rails and shall carry three strands of barbed wire.

## LINCOLN TON EQUIPMENT SHOP

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

Barbed wire shall be installed where specified and shall be composed of two strands of 12 gauge steel wire with four point barbs spaced three inches apart. Barbed wire shall conform to ASTM Designation A-121.

Tension bars shall be used for attaching fabric to all posts, except line posts, and shall consist of 1/4-inch x 3/4-inch steel, fastened to posts by beveled-edge bands.

Bottom wire shall be stretched along the fence approximately six inches above finished grade, and shall be 7 gauge coil spring wire. Fabric shall be attached to the bottom wire with fabric ties. Bracing shall be installed at all ends, gate and pull posts and in both tangents at corner posts.

All posts shall be true to line and the fence shall be adequately stretched to secure proper rigidity and alignment, shall be plumb and shall present a neat appearance.

#### 3.2 GALVANIZING

All ferrous parts shall be galvanized after fabrication in accordance with ASTM A-153 to protect against corrosion.

#### 3.3 PADLOCKS

Each gate shall be provided with a cylinder, five pin type padlock. Padlocks for all gates will be keyed alike.

**END OF SECTION**

## SECTION 02751 - PORTLAND CEMENT CONCRETE PAVING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Concrete sidewalks, stair steps, integral curbs, and ramp located at the immediate building.

#### 1.02 REFERENCES

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 1997).
- B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 1996.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 1989 (Reapproved 1997).
- D. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 1991.
- E. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 1988.
- F. ASTM A 185 - Standard Specification for Welded Steel Wire Fabric, Plain, for Concrete Reinforcement; 1997.
- G. ASTM A 497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement; 1997.
- H. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 1996a.
- I. ASTM C 33 - Standard Specification for Concrete Aggregates; 1997.
- J. ASTM C 94 - Standard Specification for Ready-Mixed Concrete; 1998.
- K. ASTM C 150 - Standard Specification for Portland Cement; 1997a.
- L. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 1997.
- M. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 1998a.
- N. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (nonextruding and Resilient Bituminous Types); 1983 (Reapproved 1991).
- O. ASTM D 1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction; 1984 (Reapproved 1996).

#### 1.03 SUBMITTALS

- A. Design Data: Indicate pavement thickness, designed concrete strength, reinforcement, and typical details.

#### 1.04 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Obtain cementitious materials from same source throughout.
- C. Follow recommendations of ACI 305R when concreting during hot weather.
- D. Follow recommendations of ACI 306R when concreting during cold weather.

#### 1.05 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

### PART 2 PRODUCTS

#### 2.01 FORM MATERIALS

- A. Form Materials: Conform to ACI 301.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D 1751) or sponge rubber or cork (ASTM D 1752).
  - 1. Thickness: 1/2 inch.

# LINCOLNTON EQUIPMENT SHOP

## 2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420); deformed billet steel bars; unfinished finish.
- B. Welded Steel Wire Fabric: Plain type, ASTM A 185; in flat sheets; unfinished.
- C. Dowels: ASTM A 615/A 615M Grade 60 (420); deformed billet steel bars; unfinished finish.

## 2.03 CONCRETE MATERIALS

- A. Concrete Materials: As specified in Section 03300.

## 2.04 ACCESSORIES

- A. Curing Compound: ASTM C 309, Type 1, Class A.

## 2.05 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

## 2.06 MIXING

- A. Transit Mixers: Comply with ASTM C 94.

# PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

## 3.02 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.

## 3.03 REINFORCEMENT

- A. Place reinforcement as indicated.

## 3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

## 3.05 JOINTS

- A. Place 1/2 inch wide expansion joints at 20 foot intervals and to separate paving from vertical surfaces and other components.
- B. Provide scored joints:
  - 1. At 5 feet intervals or as indicated.

## 3.06 FINISHING

- A. Area Paving: Light broom, texture perpendicular to pavement direction.
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.

## 3.07 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

# END OF SECTION

# LINCOLN TON EQUIPMENT SHOP

## SECTION 02815 –SEGMENTAL RETAINING WALL SYSTEM

### PART 1 - GENERAL

#### 1.01 Work Included

- A. Preparing site and foundation soil.
- B. Constructing leveling pad for retaining wall units.
- C. Furnishing and installing modular concrete retaining wall units as shown on the construction drawings.
- D. Furnishing and installing geogrid reinforcement, wall fill, and backfill to the lines and grades designated on the construction drawings.
- E. Furnishing and installing all appurtenant materials required for construction of the retaining wall as shown on the construction drawings.

#### 1.02 Related Work

- A. Earthwork - Section 02300.

#### 1.03 Applicable Standards or Specifications

##### American Society for Testing and Materials (ASTM)

ASTM C-90-90	Hollow Load-Bearing Masonry Units
ASTM C-140-75	Sampling and Testing Concrete Masonry Units
ASTM C-145-85	Solid Load-Bearing Concrete Masonry Units

##### Geosynthetic Research Institute (GRI)

GG1-87	Standard Test Method for Geogrid Rib Tensile Strength
GG2-87	Standard Test Method for Geogrid Junction Strength
GG3-91	Standard Test Method for Tension Creep Testing of Geogrids
GG4-91	Standard Practice for Determination of the Long Term Design Strength of Geogrids
GG5-91	Standard Practice for Evaluating Geogrid Pullout Behavior

##### American Society for Testing and Materials (ASTM)

ASTM D 638	Test Method for Tensile Properties of Plastic
ASTM D 1248	Specification for Polyethylene Plastics Molding and Extrusion Materials
ASTM D 4218	Test Method for Carbon Black Content in Polyethylene Compounds by the Muffle Furnace Technique.
ASTM D 1785	Specification for Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 20, 40, 80, and 120.

#### 1.04 Delivery, Storage, and Handling

- A. Retaining Wall Units:
  - 1. Contractor shall check the units upon delivery to ensure that proper materials have been received.
  - 2. Contractor shall prevent excessive mud, wet cement, epoxy, and like materials from coming in contact with and affixing to the units.

## LINCOLN TON EQUIPMENT SHOP

3. Contractor shall protect the units from damage (i.e. cracks, chips, spalls). Damaged units shall be evaluated for usage in the wall according to ASTM: C-90-75 (1981 Rev.) and ASTM: C-145-75 (1981 Rev.)
- B. Geogrid
1. Contractor shall check the geogrid upon delivery to ensure that the proper material has been received.
  2. Geogrids shall be stored above -20 F (-29 C).
  3. Contractor shall prevent excessive mud, wet cement, epoxy, and like materials from coming in contact with and affixing to the geogrid material.
  4. Rolled geogrid material may be laid flat or stood on end for storage.

### 1.05 Submittals

- A. Submit 5 sets of design drawings, calculations, and a project specific Schedule of Inspections by professional engineer, in accordance with the contract documents for approval by Architect. Drawings shall indicate all components necessary for a complete wall installation.
- B. Sample units for selection by Architect from manufacturer's full line. Also provide mockup in accordance with Division 1.

## Part 2 Products

### 2.01 Definitions

- A. Retaining wall units - modular concrete retaining wall units.
- B. Connection Strength - term used to describe the force it takes to pull out a layer of grid between two courses of modular concrete units.
- C. Geogrid - a geosynthetic formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth and function primarily as reinforcement.
- D. Wall fill - compacted soil which is within the reinforced soil mass.
- E. Backfill - compacted or in-situ soil which is behind the reinforced soil mass.
- F. Foundation soil - compacted or in-situ soil beneath the entire wall.
- G. Leveling Pad - a smooth flat surface upon which the first course of facing units are placed.

### 2.02 Modular Concrete Retaining Wall Units

- A. Concrete wall units shall have a minimum 28 day compressive strength of 3000 psi. The concrete shall have adequate freeze/thaw protection with a maximum absorption rate of 5%.
- B. Exterior dimension may vary. Standard units are required to have a minimum of .75 square foot to 1 square foot of face area for each Standard unit and a minimum of 12" depth. Unit must be capable of concave radius of 3-1/2 ft. and convex radius of 2.5 ft.
- C. Retaining wall units shall provide a minimum installed weight of 100 psf of wall face surface area.
- D. Exterior face shall be textured and colored as specified by the Owner from manufacturers regular or customer options.
- E. The units shall be positively interlocked by an anchor bar in the bottom center of the block.

## LINCOLN TON EQUIPMENT SHOP

- F. In a geogrid wall, both, the Long Term Design Strength of the geogrid and the Connection Strength of the Retaining Wall System, should be assigned a safety factor of 1.5.

### 2.03 Geogrids

- A. The geogrid shall be a regular grid structure of high density polyethylene (HDPE) or polyester. Geogrid shall be a horizontal layer of High Strength High modulus grid capable of creating a composite soil/geogrid mass that acts as a monolithic Gravity structure.

### 2.04 Acceptable Product Manufacturers

- A. Modular Concrete Retaining Wall Units
  - 1. A manufacturer pre-approved by the NCDOT.
- B. Geogrid Reinforcement
  - 1. A manufacturer pre-approved by the NCDOT.

## Part 3 Fill and Foundation Materials

### 3.01 Foundation Base Materials

- A. Material for leveling pad shall consist of compacted sands, gravel and/or concrete as shown on the construction drawings. A minimum of 6 inches of compacted base required. (When using concrete, the leveling pad should be a maximum of 3" thick, no-reinforced concrete).

### 3.02 Unit Fill

- A. Fill for units shall consist of free-draining 3/4" crushed stone or granular fill. Gradation shall include material to 3/4" minus with fines limited to 5% passing the #200 sieve and less than 50% passing the #40 sieve.
- B. Provide a drainage zone behind the wall units to within 1 foot of final grade. Cap backfill with 1 ft. of impervious material.

### 3.03 Backfill

- A. Material shall be native material unless otherwise specified in the drawings. Unsuitable soil for backfill shall not be used within the reinforced soil mass when geogrid is used for reinforcing.
- B. Where additional fill is required, contractor shall submit sample and specifications to the Architect to determine if acceptable.

## Part 4 Construction

### 4.01 Construction

- A. Contractor shall excavate to the lines and grades shown on the construction drawings. Over-Excavation shall not be paid for and replacement with compacted fill and/or wall

## LINCOLNTON EQUIPMENT SHOP

system components will be required at the contractor's expense. Contractor shall be careful not to disturb base beyond the lines shown.

### 4.02 Foundation Soil Preparation

- A. Foundation soil shall be excavated as required for footing dimensions as directed by the Engineer.
- B. Foundation soil shall be examined by the Contractor's Engineer to insure 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.
- C. Over-excavated areas shall be filled with compacted backfill material.
- D. As a minimum, soil shall be proof-rolled before construction proceeds.

### 4.03 Unit Installation (See Manufacturer's specifications for additional details).

- A. Align the first course by using a string line and LEVEL each face unit side to side and front to back. Place the first course of units side by side so they are touching.
- B. Units shall be placed side by side for the full length of the wall. Proper alignment may be achieved with the aide of string line on offset from baseline.
- C. All excess material shall be swept from the top of units prior to completing installing next course. Each course shall be completely filled prior to proceeding to next course.
- D. Fill the area between the units and back of the units with material per section 3.02 A. Make sure the material is compacted around the block. Backfill and compact every course.

### 4.04 Geogrid Installation

- A. Geogrid shall be oriented with the highest strength axis perpendicular to the wall alignment.
- B. Geogrid reinforcement shall be placed at the elevation (s) and to the extent (s) shown on the approved retaining wall shop drawings.
- C. The geogrid soil reinforcement shall be laid on top of the units and horizontally on compacted backfill. The next course of units shall be placed so that the geogrid will conform to the backside and under the lip of the top units. Embed the grid a minimum of 9 inches into the units. Pull grid taut, and anchor geogrid to compacted backfill prior to placing backfill.
- D. Slack in the geogrid shall be removed in a manner and to such a degree as approved by the Architect.
- E. Geogrid reinforcements shall be continuous throughout their embedment length (s).

### 4.05 Wall Fill Placement

- A. Wall fill shall be placed and compacted in lifts not to exceed each course.
- B. Wall fill shall be placed, spread, and compacted in such a manner that minimizes the development of slack in the geogrid.
- C. Only lightweight hand-operated compaction equipment shall be allowed within 3 feet of the wall units.
- D. Tracked construction equipment shall not be operated directly upon the geogrid. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Tracked vehicle turning should be to a minimum to prevent tracks from displacing the fill and damaging the geogrid.
- E. Rubber tired equipment may pass over the geogrid reinforcement at slow speeds, less than 10 MPH. Sudden braking and sharp turning shall be avoided.



## **LINCOLN TON EQUIPMENT SHOP**

### **4.06 Drainage System Installation**

- A. Drainage systems, both internal to the wall and surface, shall be determined based upon site conditions by the Contractor with approval from the Owner and the Design Engineer.
- B. During construction and after the wall is completed, the Contractor shall ensure that all surface drainage is directed away from the wall system by using drainage swales, area drains or other competent measures.
- C. Drainage fill and drainage pipe shall be placed behind the wall as required or specified by the Design Engineer or manufacturer.

**END OF SECTION 02815**

## SECTION 02821 - CHAIN LINK FENCES AND GATES

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Mezzanine fence framework, fabric, manual gates and related hardware.

#### 1.02 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete: Concrete anchorage for posts.

#### 1.03 REFERENCES

- A. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 1998.
- B. ASTM F 567 - Standard Practice for Installation of Chain-Link Fence; 1993 (Re-approved 1998).
- C. CLFMI CLF 2445 - Product Manual; Chain Link Fence Manufacturers Institute; 1997.

#### 1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

### PART 2 PRODUCTS

#### 2.01 MATERIALS AND COMPONENTS

- A. Materials and Components: Conform to CLFMI Product Manual.
- B. Fabric Size: CLFMI Standard Industrial, Heavy Residential service.
- C. Intermediate Posts: Type I round.
- D. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round.

#### 2.02 ACCESSORIES

- A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.
- C. Hardware for Double Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; drop bolt on inactive leaf engaging socket stop set in concrete, active leaf latched to inactive leaf preventing raising of drop bolt, padlock hasp; keepers to hold gate in fully open position.

#### 2.03 FINISHES

- A. Components (Other than Fabric): Galvanized in accordance with ASTM A 123/A 123M, at 1.7 oz/sq ft.
- B. Hardware: Hot-dip galvanized to weight required by ASTM A 153/A 153M.
- C. Accessories: Same finish as framing.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ASTM F 567.
- B. Place fabric on outside of posts and rails.
- C. Set intermediate, terminal, gate, and corner posts plumb and secure to anchor sockets welded to floor deck and steel structure.
- D. Provide top and bottom rails between line post tops and splice with 6 inch long rail sleeves.
- E. Do not stretch fabric until concrete slab has cured a minimum 14 days.
- F. Fasten fabric to top and bottom rails with tie wire at maximum 15 inches on centers.
- G. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

#### 3.02 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Position: 1 inch.

### END OF SECTION

## APPENDIX 2A - SOIL BORING LOGS

A Subsurface Investigation Boring Logs performed by ECS Ltd of Greensboro, NC follows;



**ECS CAROLINAS, LLP**

Geotechnical • Construction Materials • Environmental • Facilities NC Registered Engineering Firm F-1078

*"Setting the Standard for Service"*

May 6, 2010

Mr. William E. Ratterree  
North Carolina Department of Transportation  
1525 Mail Service Center  
Raleigh, North Carolina 27699

Reference: Report of Subsurface Exploration  
Lincolnton Equipment Shop  
Lincolnton, North Carolina  
ECS Project No. 08-6834

Dear Mr. Ratterree:

ECS Carolinas, LLP (ECS) has completed the subsurface exploration for the above referenced project. This project was authorized and performed in general accordance with ECS Proposal No. 08-11533P. The purpose of this exploration was to determine the general subsurface conditions at the site and to evaluate those conditions with regard to foundation, floor slab, seismic design, and pavement support along with general site development. This report presents our findings along with our conclusions and recommendations for design and construction of the project.

ECS Carolinas, LLP appreciates the opportunity to assist you during this phase of the project. If you have questions concerning this report, please contact our office.

Respectfully,

**ECS CAROLINAS, LLP**

Jonathan R. Almond, E.I.  
Senior Project Manager

Richard L. Nance, P.E.  
Senior Principal Engineer  
NC Registration No. 7234



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## 1. INTRODUCTION

### 1.1 Project and Site Information

ECS has been provided a site plan prepared West Consultants, PLLC, dated June 21, 2009. The plans indicate that an approximate 9,600 square foot equipment shop will be constructed at the NCDOT facility located at 499 Roper Road in Lincolnton, North Carolina. The plans indicate the facility will be constructed at a finished floor elevation of 509 feet above mean sea level. The plans also indicate that a retaining wall will be constructed to the south of the proposed building. The retaining wall will vary in height between 1 and 18 feet in height.

The site is currently a large, relatively flat parking lot with an approximate 2:1 slope to the southeast. Beyond the slope, a wooded area was observed, bordering the slope to the southeast. Topographic information provided to ECS indicates that the site slopes from the north to the south, with elevations ranging between 510 to 485 feet above mean sea level (MSL).

### 1.2 Scope of Services

Our scope of services included a subsurface exploration with soil test borings, laboratory testing, engineering analysis of the foundation support options and preparation of this report with our recommendations. The subsurface exploration included eight (8) soil test borings (B-1 through B-8). The borings were performed at the approximate locations shown on the Boring Location Diagram, Figure 2 in the Appendix, and advanced to depths between 10 to 25 ft below the existing ground surface with an ATV mounted drill rig using continuous-flight, hollow-stem augers.

## FIELD SERVICES

### 2.1 Test Locations

The soil boring locations and depths were provided by the design team in the RFP submittal package. The actual test locations were established in the field by ECS representatives using tape and existing site features references. The approximate test locations are shown on the Boring Location Diagram (Figure 2) presented in the Appendix of this report, and should be considered accurate only to the degree implied by the method used. Ground surface elevation at each boring location was estimated from the site topographic survey provided by NCDOT and should be considered approximate.

### 2.2 Standard Penetration Test (SPT) Drilling

Eight (8) soil test borings were drilled to evaluate the stratification and engineering properties of the subsurface soils at the project site. Standard Penetration Tests (SPT's) were performed at designated intervals in general accordance with ASTM D 1586-84. The Standard Penetration Test is used to provide an index for estimating soil strength and density. In conjunction with the penetration testing, split-barrel soil samples were recovered for soil classification and potential laboratory tests at each test interval. Boring Logs are included in the Appendix.

The drill crew also maintained a field log of the soils encountered at each of the boring locations. After recovery, each sample was removed from the auger and visually classified. Representative portions of each sample were then sealed and brought to our laboratory in Charlotte, North Carolina for further visual examination and laboratory testing. Groundwater measurements were attempted at the termination of drilling at each boring location and subsequently up to 24 hours after boring termination.

### **3. LABORATORY SERVICES**

Soil samples were collected from the borings and examined in our laboratory to check field classifications and to determine pertinent engineering properties. Data obtained from the borings and our visual/manual examinations are included on the respective boring logs in the Appendix.

#### **3.1 Soil Classification**

A geotechnical engineer classified each soil sample on the basis of color, texture, and plasticity characteristics in general accordance with the Unified Soil Classification System (USCS). The soil engineer grouped the various soil types into the major zones noted on the boring logs. The stratification lines designating the interfaces between earth materials on the boring logs and profiles are approximate; in situ, the transition between strata may be gradual in both the vertical and horizontal directions. The results of the visual classifications are presented on the Test Boring Records included in Appendix.

#### **3.2 Laboratory Testing**

In addition to visual classification, one select split spoon samples was subjected to Atterberg limits testing (ASTM D 4318) and natural moisture testing (ASTM D 2296). Atterberg limits testing was performed to better define the plasticity of the residual soils on-site. The laboratory test results are included in the Appendix.

### **4. SITE AND SUBSURFACE FINDINGS**

#### **4.1 Area Geology**

The site is located in the Piedmont Physiographic Province of North Carolina. The native soils in the Piedmont Province consist mainly of residuum with underlying saprolites weathered from the parent bedrock, which can be found in both weathered and unweathered states. Although the surficial materials normally retain the structure of the original parent bedrock, they typically have a much lower density and exhibit strengths and other engineering properties typical of soil. In a mature weathering profile of the Piedmont Province, the soils are generally found to be finer grained at the surface where more extensive weathering has occurred. The particle size of the soils generally becomes more granular with increasing depth and gradually changes first to weathered and finally to unweathered parent bedrock. The mineral composition of the parent rock and the environment in which weathering occurs largely control the resulting soil's engineering characteristics. The published information pertaining to the geology in the general vicinity of the site indicates the parent bedrock underlying the property is metamorphosed diorite that have experienced intrusion by igneous diorite and quartzite which have in turn experienced further metamorphism. The onsite residual soils are the product of the weathering of the parent bedrock.

It is important to note that the natural geology within the site has been modified in the past by grading that included the placement of fill materials. The quality of man-made fills can vary significantly, and it is often difficult to assess the engineering properties of existing fills. Furthermore, there is no specific correlation between N-values from standard penetration tests performed in soil test borings and the degree of compaction of existing fill soils; however, a qualitative assessment of existing fills can sometimes be made based on the N-values obtained and observations of the materials sampled in the test borings.

## **4.2 Subsurface Conditions**

The subsurface conditions at the site, as indicated by the borings, generally consist of fill, residual soil to the depths explored. The generalized subsurface conditions are described below. For general soil stratification at a particular boring location, the respective Boring Log found in the Appendix should be reviewed.

Topsoil and gravel were generally found in the borings. Topsoil was encountered between depths of 3 and 7 inches in six (6) borings. Gravel was encountered in two (2) borings at depths ranging between 3 and 4 inches.

Fill soils were encountered in borings B-3, B-5, and B-8. The fill soils were encountered near ground surface and extended to depths ranging between 3 and 8 feet. The fill soils encountered consisted of Silty SAND, Clayey SILT, and Sandy CLAY, exhibiting SPT N-values between 4 and 8 blows per foot (bpf). Fill soils encountered in boring B-5 contained wood fragments and B-8 contained asphalt fragments.

Residual soils were encountered below the fill materials or ground surface at the boring locations. Residual soils are formed by the in-place chemical and mechanical weathering of the parent bedrock. The residual soils were first encountered at depths ranging from 0 to 8 ft below the ground surface and extend to depths of boring termination at 10 to 25 ft below the ground surface. The residual soils observed in the borings mainly consisted of Clayey SILT, Sandy SILT, and Silty SAND. N-values recorded in the residuum ranged from 3 to 29 bpf.

## **4.3 Groundwater Observations**

Groundwater level readings were attempted during the time of drilling, after termination of drilling, and again after 24 hours. No groundwater was recorded within the borings performed on-site. Fluctuations in the groundwater elevation should be expected depending on precipitation, run-off, utility leaks, and other factors not evident at the time of our evaluation. Normally, highest groundwater levels occur in late winter and spring and the lowest levels occur in late summer and fall.

## **5. CONCLUSIONS AND RECOMMENDATIONS**

The borings performed at this site represent the subsurface conditions at the location of the borings only. Due to existing fill and the prevailing geology, there can be changes in the subsurface conditions over relatively short distances that have not been disclosed by the results of the borings performed. Consequently, there may be undisclosed subsurface conditions that require special treatment or additional preparation once these conditions are revealed during construction.

Our evaluation of foundation support conditions has been based on our understanding of the site, project information and the data obtained in our exploration. The general subsurface conditions utilized in our foundation evaluation have been based on interpolation of subsurface data between the borings. In evaluating the boring data, we have examined previous correlations between penetration resistance values and foundation bearing pressures observed in soil conditions similar to those at your site.



## 5.1 Site Development Considerations

Fill encountered at borings B-3, B-5, and B-8 appears to be undocumented and variable. Founding the structures on variable uncontrolled fill can cause substantial total and differential settlements. Therefore, where structures are planned in areas with existing undocumented fill, the undocumented fill should be removed down to virgin ground or rock and replaced with engineered fill.

ECS anticipates that minor areas of fill will be encountered in the proposed building pad and retaining wall areas. ECS recommends that the fill be removed within these areas. ECS reviewed historical topography dated 1991 in preparation of this report. The historical topographic information indicates that the fill predates the 1991 maps. If no records indicating that the fill was placed in an engineered manner, the fill must be considered undocumented. The risks associated with undocumented fill are detailed below. ECS recommends that the fill materials be removed in structural areas and replaced with engineered fill. The below recommendations are provided under the assumption that all existing undocumented fill materials will be removed.

## 5.2 Undocumented Fill

ECS anticipates that undocumented fill will be present at subgrade elevation in portions of the proposed structure. Undocumented fill poses risks associated with undetected debris, voids, deleterious inclusions within the fill and/or deleterious materials at the virgin ground fill interface that are covered by the fill. Deleterious materials can consist of significant amount of organics derived from organic rich strippings, rubbish, construction or demolition debris, stumps and roots, and logs. If these materials are covered over by or are within undocumented fill, the organic materials tend to decompose slowly in the anaerobic conditions in or under the fill. Decomposition can occur over periods ranging from several years to several decades. As the organic materials decompose, a void is created which can create soft conditions and even subsidence in areas above the organics. Where these types of conditions exist under or within undocumented fill, they are sometimes in discreet pockets that can go undetected by normal subsurface exploration techniques, i.e., soil test borings and test pits.

The magnitude of settlement or subsidence associated with the organic materials is generally related to the volume of organic materials. Therefore, when undocumented fill is present, soil test borings and test pits can indicate generally good conditions when, in fact, undiscovered pockets of organics occur under buildings or parking lots. After the structure has been in place for some time, the extra load, or pressure, caused by new facility or new fill constructed on the undocumented fill causes subsidence and consolidation which is reflected in settlement, sometimes excessive, in the parking lot surface or in the structure. Resurfacing of parking lots can be utilized to repair "bird baths" created by subsidence at a generally acceptable cost.

When subsidence causes differential settlements that impose excessive stresses on structural members, the cost is typically substantial. This can entail underpinning of foundations to raise portions of the structure that has settled excessively, as well as, repair to cracked walls, overstressed columns, beams, and connections where such results.

The problem with uncontrolled fill is that the degree of risk associated with the above factors and consequences cannot be quantified. Soil test borings on a very close grid of 20 to 30 ft could still miss significant discreet volumes of organics such as a stump pile. The only way to totally eliminate the risk associated with undocumented fill is to remove it, exposing the original ground and allowing evaluation of the quality of the material in the fill volume. This is often expensive and time consuming.

The other end of the risk spectrum, would be to accept the risks based on whatever information is available and deal with the consequences, if any, later. An intermediate measure is to remove undocumented fill exposing virgin ground under foundations where the consequences can be greatest.

### **5.3 Foundations**

Based upon the available soils data, ECS recommends that the fill materials be undercut within the proposed building footprint and retaining wall areas. We offer this recommendation with the anticipation that the owner will not accept the risk of poor performance associated with building or retaining wall on undocumented fill. ECS recommends that the fill materials be removed completely and replaced with structural fill. Existing fill depths are anticipated to range between 3 and 8 feet in the building footprint.

Provided the recommendations outlined herein are implemented, the proposed structure can be adequately supported on a shallow foundation system consisting of spread footings bearing on undisturbed residual soil, newly-placed structural fill, or partially weathered rock. A bearing capacity of up to 3 ksf may be achievable for foundations bearing on firm residual soil or newly placed structural fill.

In order to reduce the possibility of foundation bearing failure and excessive settlement due to local shear or "punching" action, the 2009 North Carolina Building Code requires that footings have a minimum width of 18 inches. For this project, minimum wall and column footing dimensions of 18 and 24 inches, respectively, should be maintained to reduce the possibility of a localized, "punching" type, shear failure. Exterior foundations and foundations in unheated areas should be embedded deep enough below exterior grades to reduce potential movements from frost action or excessive drying shrinkage. For this region, we recommend footings be placed at least 18 inches below finished grade.

Based on the subsurface conditions encountered, undocumented fill is properly removed and replaced with structural fill, and site preparation recommendations discussed herein are incorporated, total and differential settlement should be within tolerable limits. Total settlement is anticipated to be less than 1.0 inch while differential settlement between columns is anticipated to be less than 0.5 inch for shallow foundations.

### **5.4 Slab-On-Grade Support**

Slabs-on-grade can be adequately supported on undisturbed residual soils or on new, properly placed structural fill provided the site preparation and fill recommendations outlined herein are implemented. For a properly prepared site, a modulus of subgrade reaction (k) for the soil of 100 pounds per cubic inch for the soil can be used. This value is representative of a 1-ft square loaded area and may need to be adjusted depending the size and shape of the loaded area depending on the method of structural analysis.

We recommend the slabs-on-grade be underlain by a minimum of 4 inches of granular material having a maximum aggregate size of 1½ inches and no more than 2 percent fines. Prior to placing the granular material, the floor subgrade soil should be properly compacted, proofrolled, and free of standing water, mud, and frozen soil. A properly designed and constructed capillary break layer can often eliminate the need for a moisture retarder and can assist in more uniform curing of concrete. If a vapor retarder is considered to provide additional moisture protection, special attention should be given to the surface curing of the slabs to minimize uneven drying of the slabs and associated cracking and/or slab curling. The use of a blotter or cushion layer above the vapor retarder can also be considered for project specific reasons.

Please refer to ACI 302.1R96 Guide for Concrete Floor and Slab Construction and ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs for additional guidance on this issue.

ECS recommends that the slab be isolated from the footings so differential settlement of the structure will not induce shear stresses on the floor slab. Also, in order to minimize the crack width of shrinkage cracks that may develop near the surface of the slab, we recommend mesh reinforcement as a minimum be included in the design of the floor slab. For maximum effectiveness, temperature and shrinkage reinforcements in slabs on ground should be positioned in the upper third of the slab thickness. The Wire Reinforcement Institute recommends the mesh reinforcement be placed 2 inches below the slab surface or upper one-third of slab thickness, whichever is closer to the surface.

Adequate construction joints, contraction joints and isolation joints should also be provided in the slab to reduce the impacts of cracking and shrinkage. Please refer to ACI 302.1R96 Guide for Concrete Floor and Slab Construction for additional information regarding concrete slab joint design.

### **5.5 Seismic Site Class**

The 2009 Edition of the North Carolina Building Code (NCBC) requires that the stiffness of the top 100-ft of soil profile be evaluated in determining a site seismic classification. Alternately, designers can default by Code to a Site Class "D" site assumption, unless soils data further reduces the site to an "E" classification. The soil data available to date indicates that the average soils profile is a site class "D".

The available soils data indicate that potential for liquefaction of on-site soils is not evident.

### **5.6 Below Grade Excavation**

Based on the results of our subsurface exploration, it appears that the onsite soils, within the depths of the borings, may be excavated with conventional construction equipment. Although there can be changes in the subsurface conditions over relatively short distances, problems associated with mass grading of very dense soils are not anticipated for this project. However, the grading contractor should be prepared for heavy excavation during utility installation where PWR is encountered near surface.

We have generally found that materials that our soil drilling augers can penetrate can also be excavated with a large backhoe or ripped with a dozer mounted ripper. Weathered rock or rock that cannot be penetrated by the mechanical auger will normally require blasting to loosen it for removal. It has been our experience that subsurface material with a Standard Penetration Resistance value of 50/6, 50/5, and 50/4 inches of penetration can likely be loosened and ripped using a D-8 dozer equipped with a single-tooth ripper. For confined excavations, such material can be removed with a John Deere 120C or equivalent excavator equipped with rock teeth. Subsurface material that exhibited a Standard Penetration Resistance value of 50/3, 50/2, and 50/1 inches of penetration or less will likely require blasting for removal.

### 5.6.1 Below-Grade Walls

Below-grade walls and retaining systems should be designed to withstand lateral earth pressures from the backfill and supported soils. Backfill materials consisting of sandy silts and silty sands are suitable for use as backfill behind conventional below-grade walls provided they are compacted in accordance with those procedures outlined in the geotechnical report.

The following soil parameters can be used to compute the lateral earth pressures associated with a level backfill that consists of approved soils (SM, SC, ML). However, it should be noted that these lateral earth pressures only include the weight of the backfill, and do not account for any applied surcharge loads that may be presented behind the walls. We recommend that a moist unit weight of 125 pounds per cubic foot (pcf) be utilized for calculating wall pressures on below grade walls that will retain engineered fill.

- |                 |  |
|-----------------|--|
| 1. $K_o = 0.53$ | At-rest Earth Pressure Coefficient<br>(Wall Fixed)         |
| 2. $K_a = 0.36$ | Active Earth Pressure Coefficient<br>(Wall Free to Rotate) |
| 3. $K_p = 2.76$ | Passive Earth Pressure Coefficient                         |

Sliding resistance on the base of concrete footings for below-grade walls can be calculated using the coefficient of friction equal to 0.50. A factor of safety of at least 1.5 should be applied to these sliding computations.

The parameters given above are for walls without appreciable back slopes. Sloping backfill behind the wall will significantly increase the lateral pressure applied to the wall, which will require modification of the earth pressure coefficients.

### 5.8 **Permanent Groundwater Control**

ECS does not anticipate that a permanent groundwater control system will be required for the structure.

### 5.9 **Temporary Groundwater and Dewatering**

ECS recommends that the grading contractor promote positive surface drainage away from the proposed building pad during grading. Ponding of surface water can lead to instability of the subgrade soils.

### 5.10 **Cut and Fill Slopes**

ECS anticipates that site grading will require the construction of fill slopes on the southern portion of the site. We recommend that permanent cut slopes with less than 10 ft crest height through undisturbed residual soils be constructed at 2:1 (horizontal: vertical) or flatter. Permanent fill slopes and cut slopes in previously placed engineered fill less than 20 ft tall may be constructed using controlled fill at a slope of 2.5:1 or flatter. A slope of 3:1 or flatter may be desirable to permit establishment of vegetation, safe mowing, and maintenance. The surface of all cut and fill slopes

should be adequately compacted. All permanent slopes should be protected using vegetation or other means to prevent erosion.

The outside face of building foundations and the edges of pavements placed near slopes should be located an appropriate distance from the slope. The North Carolina Building Code lists the following requirements. Buildings or pavements placed at the top of fill slopes should be placed near slopes at distance equal to at least  $1/3$  of the height of the slope behind the crest of the slope, but that distance need not be more than 40 ft.

Buildings or pavements near the bottom of a slope should be located at least  $1/2$  of the height of the slope from the toe of the slope, but the distance need not be more than 15 ft.

Slopes with structures located closer than these limits or slopes taller than the height limits indicated, should be specifically evaluated by the geotechnical engineer and may require approval from the building code official. Temporary slopes in confined or open excavations should perform satisfactorily at inclinations of 2(H):1(V). All excavations should conform to applicable OSHA regulations.

Appropriately sized ditches should run above and parallel to the crest of all permanent slopes to divert surface runoff away from the slope face. To aid in obtaining proper compaction on the slope face, the fill slopes should be overbuilt with properly compacted structural fill and then excavated back to the proposed grades.

## **6 CONSTRUCTION CONSIDERATIONS**

### **6.1 Site Preparation**

The proposed construction area should be stripped of all topsoil, organic material existing undocumented fill and other soft or unsuitable material. Any resulting isolate excavations should be backfilled with suitable fill material. Upon completion of these stripping operations, the exposed subgrade in areas to receive fill should be proofrolled with a loaded dump truck or similar pneumatic-tired vehicle having a loaded weight of approximately 25 tons. After excavation, the exposed subgrades in cut areas should be similarly proofrolled.

Proofrolling operations should be performed under the observation of a geotechnical engineer or his authorized representative. The proofrolling should consist of two (2) complete passes of the exposed areas, with each pass being in a direction perpendicular to the preceding one. Any areas which deflect, rut or pump during the proofrolling, and fail to be remedied with successive passes, should be undercut to suitable soils and backfilled with compacted fill.

The ability to dry wet soils, and therefore the ability to use them for fill, will likely be reduced if earthwork is performed during spring or summer. If earthwork is performed during winter or after appreciable rainfall then subgrades may be unstable due to wet soil conditions, which could increase the amount of undercutting required. Drying of wet soils, if encountered, may be accomplished by spreading and discing or by other mechanical or chemical means. We recommend a shrinkage factor of 15 percent for calculating earthwork balances using site soils as fill.

## 6.2 Fill Material and Placement

The project fill should be soil that has less than five percent organic content and a liquid limit and plasticity index less than 50 and 20, respectively. Soils with Unified Soil Classification System group symbols of SP, SW, SM, SC, and ML are generally suitable for use as project fill. Soils with USCS group symbol of CL that meet the restrictions for liquid limit and plasticity index are also suitable for use as project fill. Soils with USCS group symbol of MH or CH (high plasticity soil) or corrosive soils are not suitable for use as project fill.

The fill should exhibit a maximum dry density of at least 90 pounds per cubic foot, as determined by a standard Proctor compaction test (ASTM D 698). We recommend that moisture control limits of -3 to +2 percent of the optimum moisture content be used for placement of project fill with the added requirement that fill soils placed wet of optimum remain stable under heavy pneumatic-tired construction traffic. During site grading, some moisture modification (drying and/or wetting) of the onsite soils will likely be required. The onsite silty sands and sandy silts appear suitable for use as project fill.

Project fill should be compacted to at least 95 percent of its standard Proctor maximum dry density except within 24 inches of finished soil subgrade elevation beneath slab-on-grade, foundations, and pavements. Within the top 24 inches of finished soil subgrade elevation beneath shallow foundations, the approved project fill should be compacted to at least 100 percent of its standard Proctor maximum dry density. Aggregate base course (ABC) stone should be compacted to 100 percent of standard Proctor maximum dry density. However, for isolated excavations around footing locations or within utility excavations, a hand tamper will likely be required. ECS recommends that field density tests be performed on the fill as it is being placed, at a frequency determined by an experienced geotechnical engineer, to verify that proper compaction is achieved.

The maximum loose lift thickness depends upon the type of compaction equipment use. The table below provides maximum loose lifts that may be placed based on compaction equipment utilized.

### LIFT THICKNESS RECOMMENDATIONS

Equipment	Maximum Loose Lift Thickness, in.
Large, Self-Propelled Equipment (CAT 815, etc.)	8
Small, Self-Propelled or Remote Controlled (Rammax, etc.)	6
Hand Operated (Plate Tamps, Jumping Jacks, Wacker-Packers)	4

ECS recommends that fill operations be observed and tested by an engineering technician to determine if compaction requirements are being met. The testing agency should perform a sufficient number of tests to confirm that compaction is being achieved. For mass grading operations we recommend a minimum of one density per 300 cubic yards of fill placed or per 1 foot of fill thickness, whichever results in more tests. When dry, the majority of the site soil should provide adequate subgrade support for fill placement and construction operations. When wet, the soil may degrade quickly with disturbance from construction traffic. Good site drainage should be maintained during earthwork operations to prevent ponding water on exposed subgrades.

We recommend at least one test per 1 foot thickness of fill for every 100 linear ft of utility trench backfill. Where fill will be placed on existing slopes, we recommend that benches be cut in the existing slope to accept the new fill. All fill slopes should be overbuilt and then cut back to expose compacted material on the slope face. While compacting adjacent to below-grade walls, heavy construction equipment should maintain a horizontal distance of 1(H):1(V). If this minimum distance cannot be maintained, the compaction equipment should run perpendicular, not parallel to, the long axis of the wall.

### **6.3 Foundation Construction & Testing**

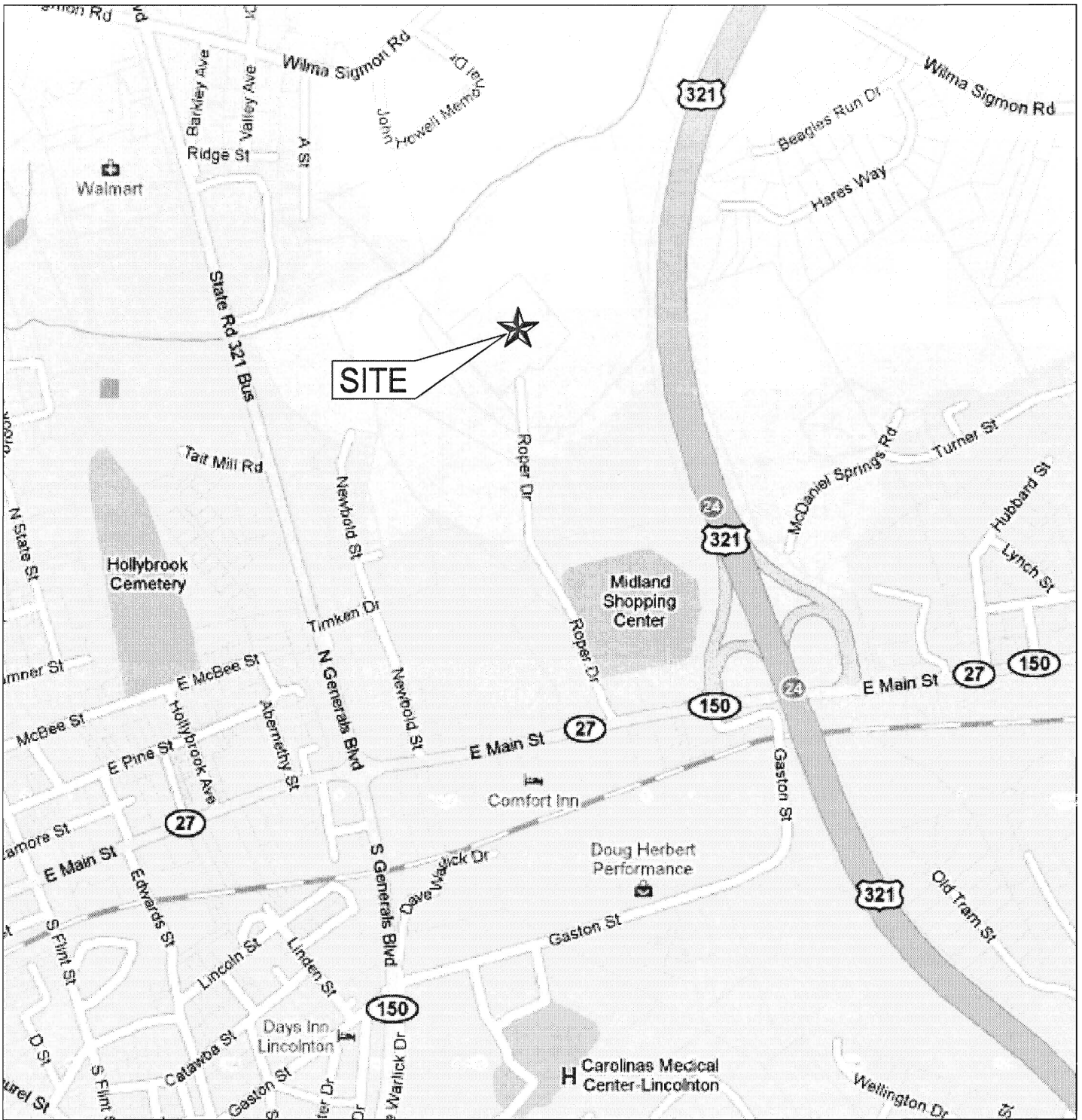
Foundation excavations should be tested to confirm adequate bearing prior to installation of reinforcing steel or placement of concrete. Unsuitable soils should be undercut to firm soils and the undercut excavations should be backfilled with compacted controlled fill. Exposure to the environment may weaken the soils at the footing bearing level if the foundation excavations remain open for too long a time; therefore, foundation concrete should be placed the same day that foundations are excavated. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the foundation excavation bottom immediately prior to placement of concrete. If the excavation must remain open overnight, or if rainfall becomes imminent while the bearing soils are exposed, a 1- to 3-inch thick "mud mat" of "lean" concrete may be placed on the bearing surface to protect the bearing soils. The mud mat should not be placed until the bearing soils have been tested for adequate bearing capacity. Foundations undercut should be backfilled with engineered fill. If lean concrete is placed within the undercut zone, the foundation footprint does not require oversizing. However, if soil or ABC stone is used in lieu of lean concrete, the foundation footprint should be oversized on a 1V:1H scale.

We recommend testing all shallow foundations to confirm the presence of foundation materials similar to those assumed in the design. We recommend the testing consist of hand auger borings with Dynamic Cone Penetrometer testing performed by an engineer or engineering technician.

## **7 GENERAL COMMENTS**

The borings performed at this site represent the subsurface conditions at the location of the borings only. Due to the prevailing geology, changes in the subsurface conditions can occur over relatively short distances that have not been disclosed by the results of the borings performed. Consequently, there may be undisclosed subsurface conditions that require special treatment or additional preparation once these conditions are revealed during construction.

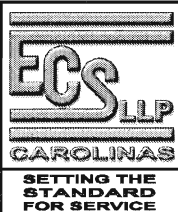
Our evaluation of foundation support conditions has been based on our understanding of the site and project information and the data obtained in our exploration. The general subsurface conditions utilized in our foundation evaluation have been based on interpolation of subsurface data between the test holes. If the project information is incorrect or if the structure locations (horizontal or vertical) and/or dimensions are changed, please contact us so that our recommendations can be reviewed. The discovery of any site or subsurface conditions during construction which deviate from the data outlined in this exploration should be reported to us for our evaluation. The assessment of site environmental conditions for the presence of pollutants in the soil, rock, and ground water of the site was beyond the scope of this exploration.



**LEGEND:**



<b>Source:</b>
Google Maps



**FIGURE 1**  
**SITE LOCATION MAP**  
**Lincolnton Equipment Shop**  
**Monroe, North Carolina**

PROJ. MGR. JRA	SCALE N.T.S.
DRAFTSMAN KDO	PROJECT NO. 08-6834
REVISIONS	FIGURE 1
	DATE 04-09-10





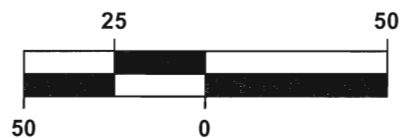
WILLIAM CHAPMAN  
DB 510 FC 928  
ZONED GMC

**LEGEND:**

= Approximate Location of Boring



**SCALE (IN FEET)**



**Source:**  
Site Plan Sheet No. C2  
Provided by West Consultants, PLLC  
Dated 07-21-09

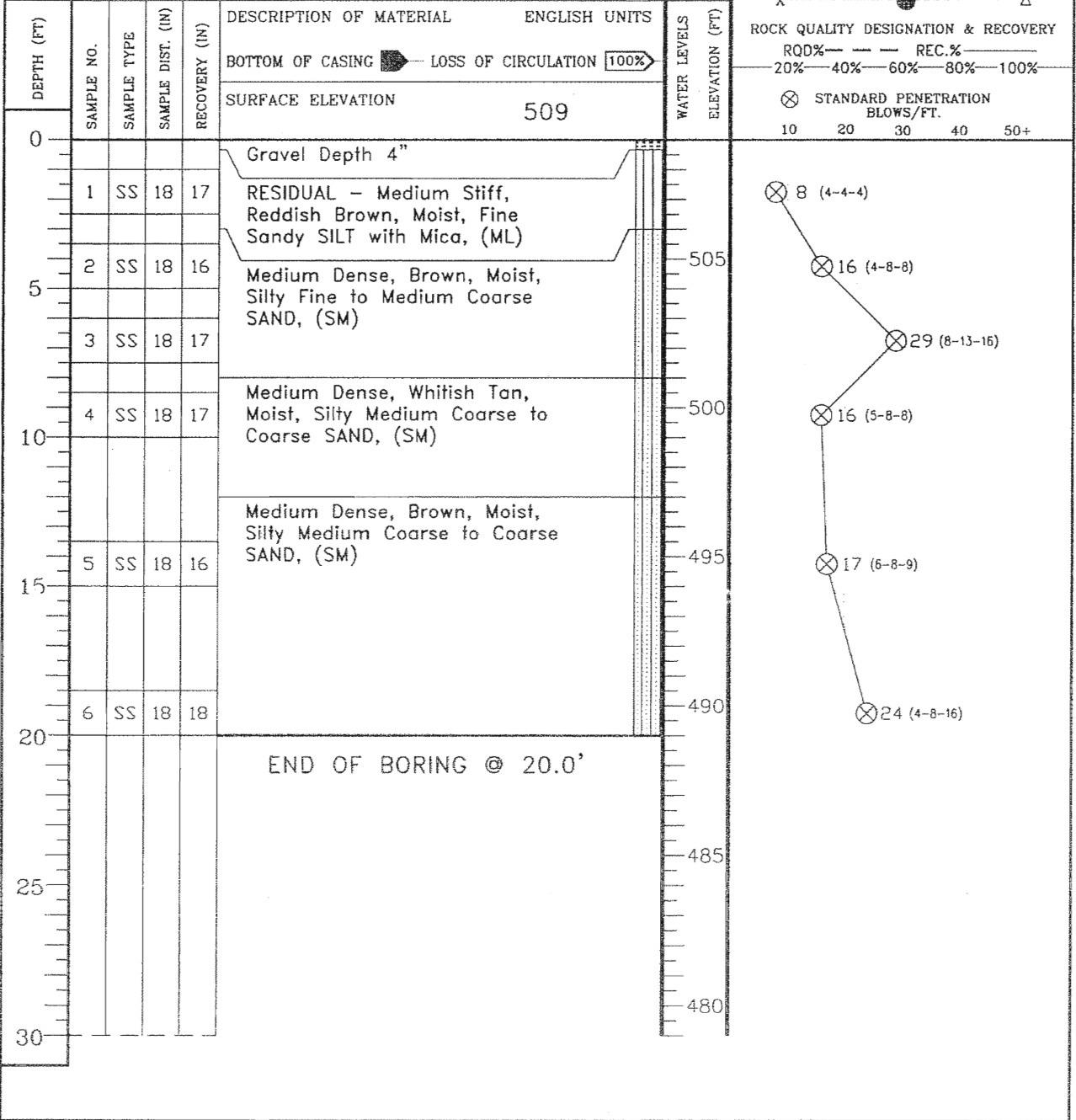


**FIGURE 2**  
Boring Location Diagram  
Lincolnton Equipment Shop  
Monroe, North Carolina

PROJ. MGR. JRA	SCALE As Shown
DRAFTSMAN KDO	PROJECT NO. 08-6834
REVISIONS	FIGURE 2
	DATE 04-09-10

CLIENT NCDOT	JOB # 08-6834	BORING # B-1	SHEET 1 OF 1	
PROJECT NAME Lincolnton Equipment Shop		ARCHITECT-ENGINEER		

SITE LOCATION			CALIBRATED PENETROMETER TONS/FT. <sup>2</sup> 1 2 3 4 5+
			PLASTIC LIMIT %      WATER CONTENT %      LIQUID LIMIT % X      -----      Δ




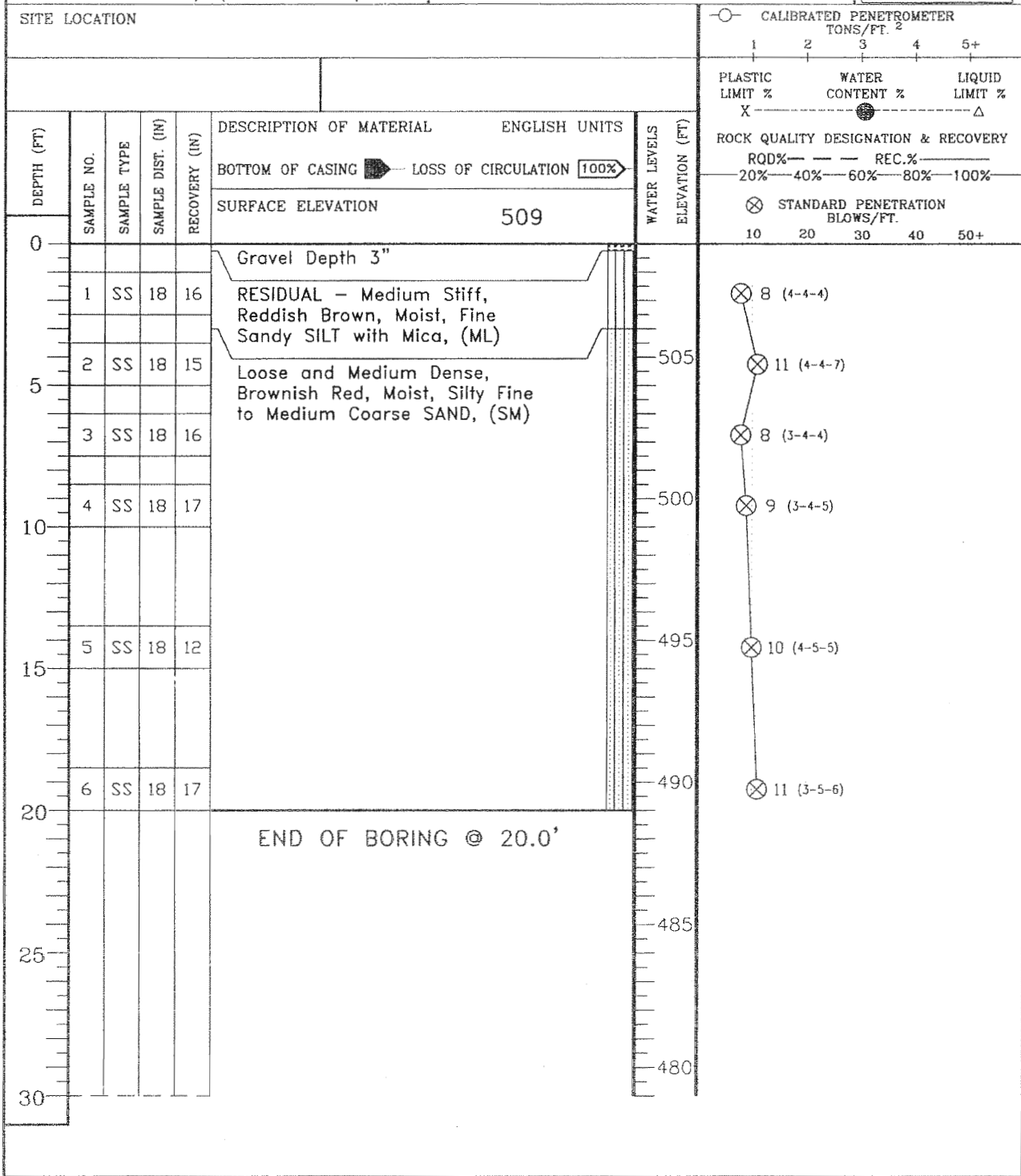
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL GNE	WS OR	BORING STARTED	04/19/10
▽ WL (BCR)	▽ WL (ACR)	BORING COMPLETED	04/19/10
▽ WL	RIG D50T	FOREMAN HPC	DRILLING METHOD HSA

CAVE IN DEPTH @ 14.0'

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CLIENT NCDOT	JOB # 08-6834	BORING # B-2	SHEET 1 OF 1	
PROJECT NAME Lincolnton Equipment Shop		ARCHITECT-ENGINEER		



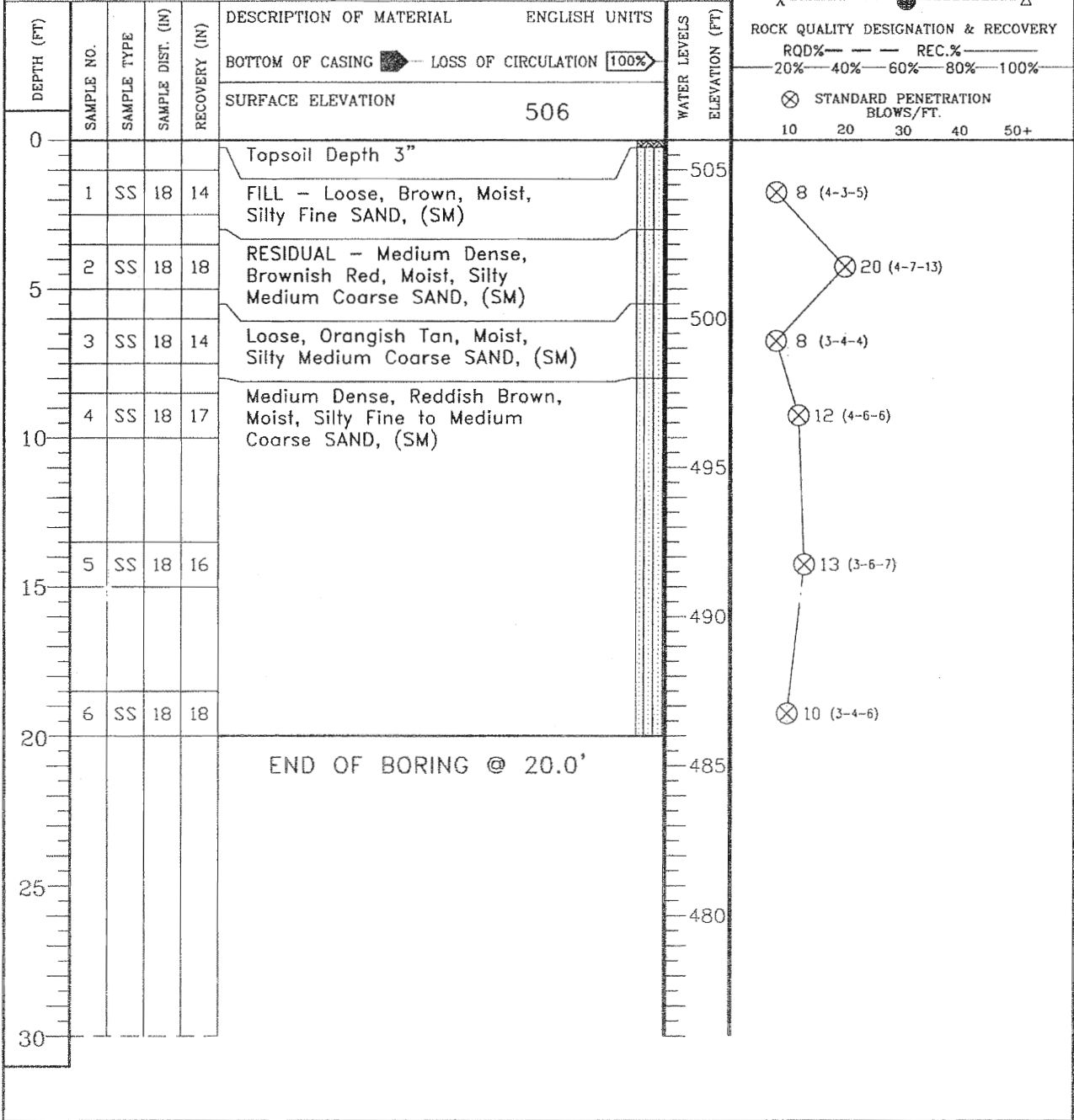
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL GNE	WS OR (D)	BORING STARTED	04/19/10	
▽ WL (BCR)	▽ WL (ACR)	BORING COMPLETED	04/19/10	CAVE IN DEPTH @ 14.2'
▽ WL		RIG D50T	FOREMAN HPC	DRILLING METHOD HSA

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CLIENT NCDOT	JOB # 08-6834	BORING # B-3	SHEET 1 OF 1	
PROJECT NAME Lincolnton Equipment Shop		ARCHITECT-ENGINEER		

SITE LOCATION	○ CALIBRATED PENETROMETER TONS/FT. <sup>2</sup> 1 2 3 4 5+ PLASTIC LIMIT %      WATER CONTENT %      LIQUID LIMIT % X ----- ● ----- Δ ROCK QUALITY DESIGNATION & RECOVERY RQD% --- REC.% --- 20% 40% 60% 80% 100% ⊗ STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+
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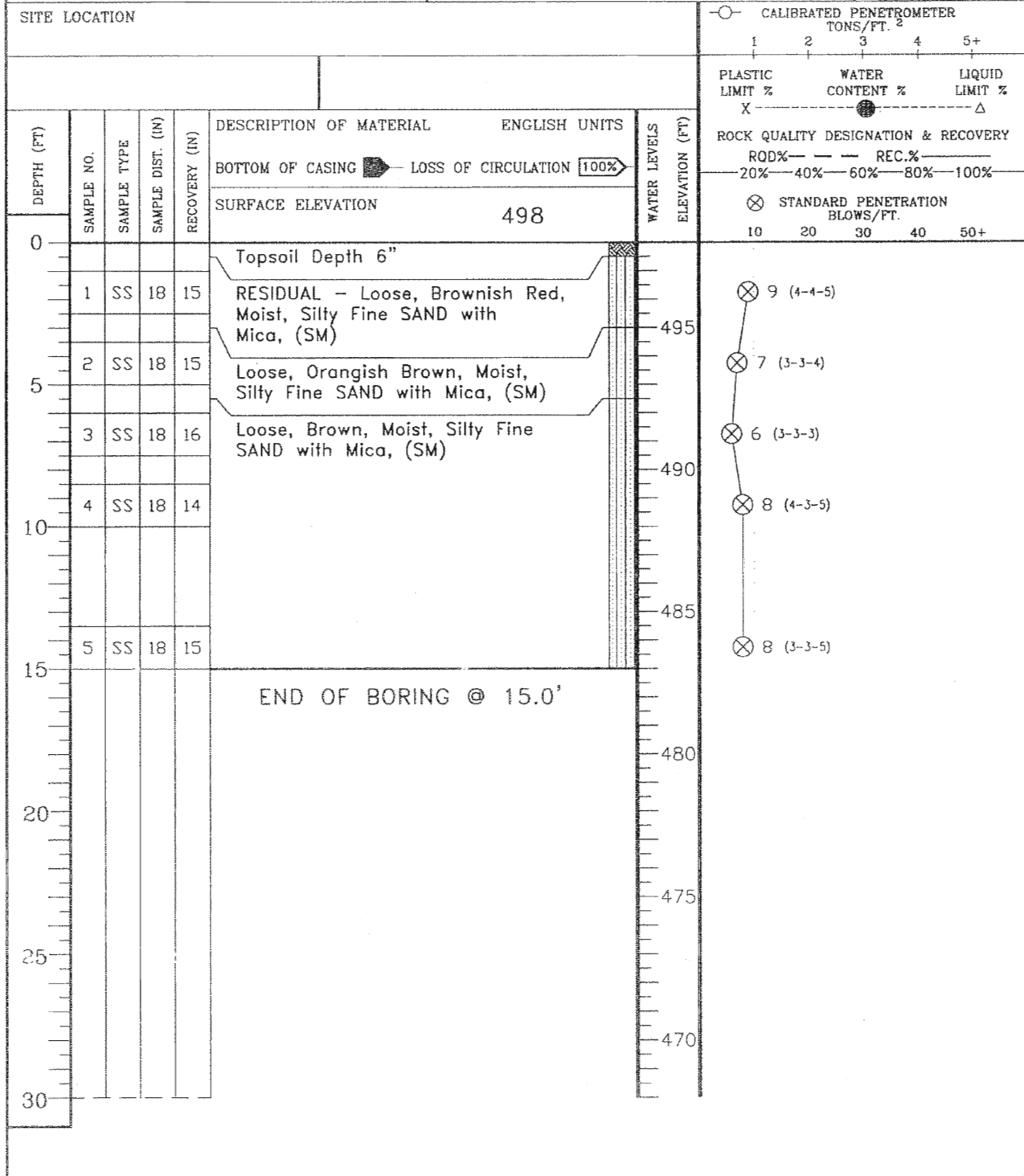


THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL.

▽ WL GNE	WS OR (D)	BORING STARTED	04/19/10	
▽ WL (BCR)	▽ WL (ACR)	BORING COMPLETED	04/19/10	CAVE IN DEPTH @ 14.2'
▽ WL		RIG D50T	FOREMAN HPC	DRILLING METHOD HSA

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CLIENT NCDOT	JOB # 08-6834	BORING # B-4	SHEET 1 OF 1	
PROJECT NAME Lincolnton Equipment Shop		ARCHITECT-ENGINEER		



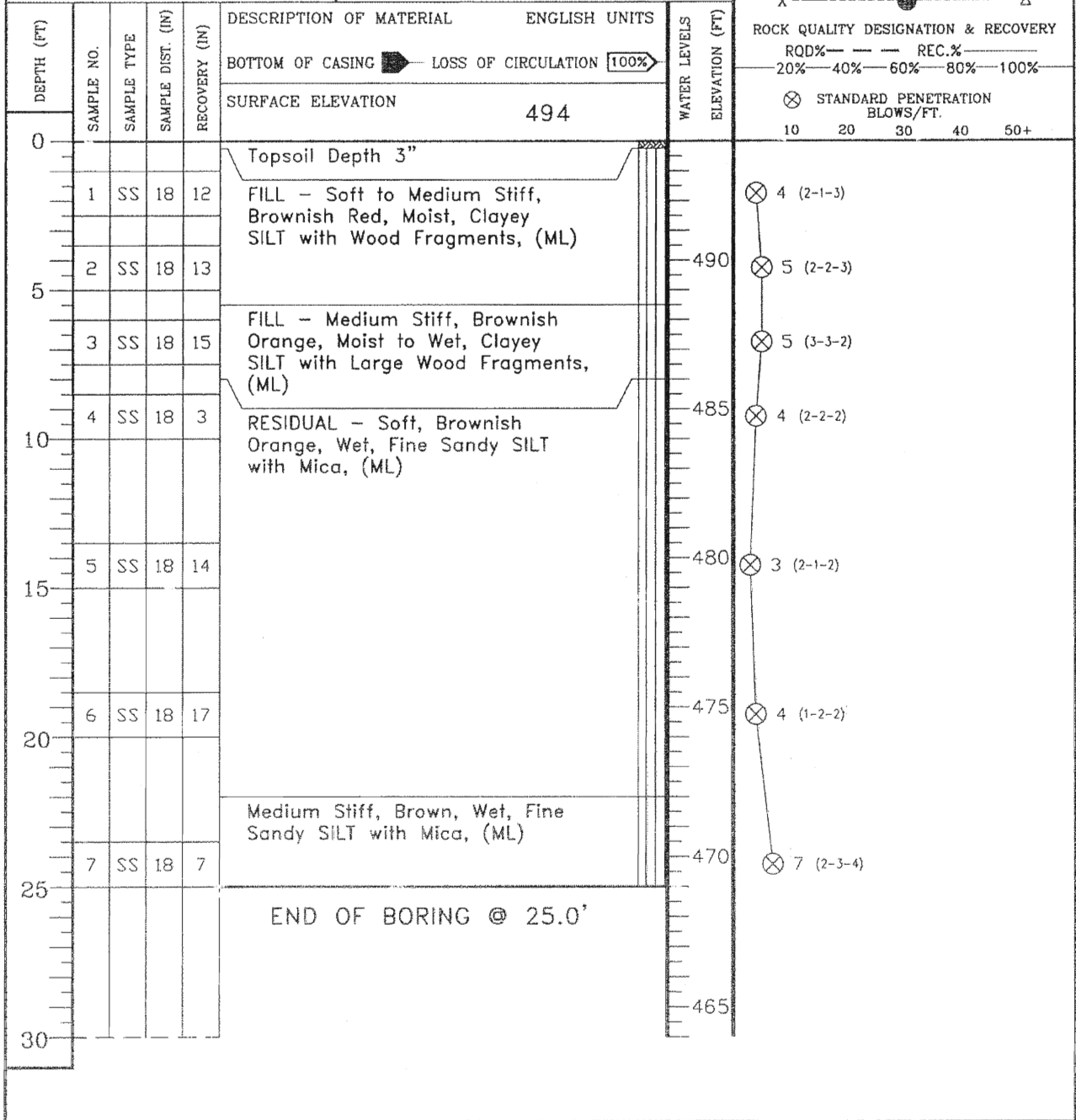
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL GNE	WS OR	BORING STARTED	04/19/10	
▽ WL(BCR)	▽ WL(ACR)	BORING COMPLETED	04/19/10	CAVE IN DEPTH @ 10.8'
▽ WL		RIG D50T	FOREMAN HPC	DRILLING METHOD HSA

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CLIENT NCDOT	JOB # 08-6834	BORING # B-5	SHEET 1 OF 1	
PROJECT NAME Lincolnton Equipment Shop		ARCHITECT-ENGINEER		

SITE LOCATION			○ CALIBRATED PENETROMETER TONS/FT. <sup>2</sup> 1 2 3 4 5+
			PLASTIC LIMIT %      WATER CONTENT %      LIQUID LIMIT % X ----- ● ----- Δ

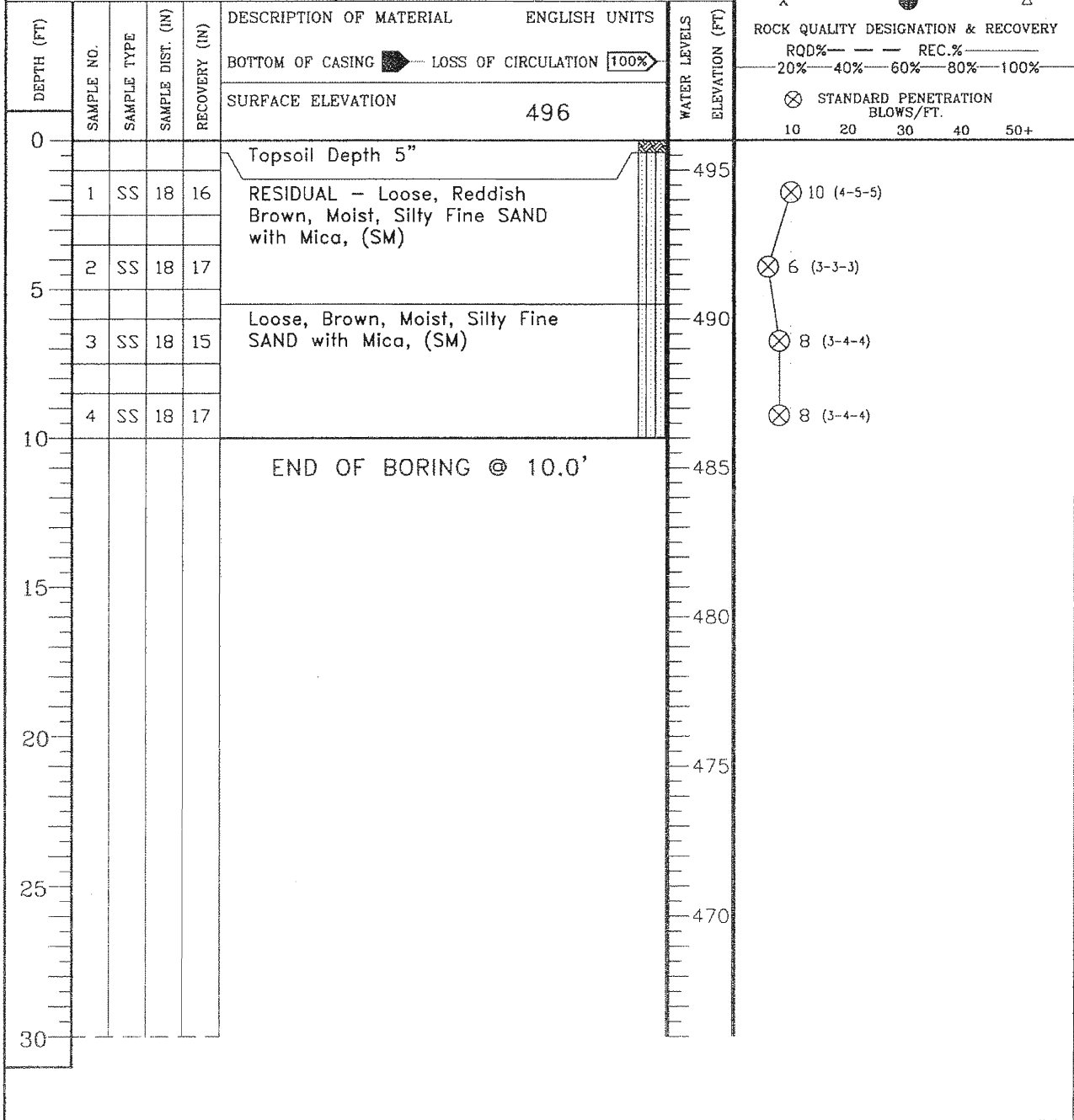


THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL			
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▽ WL (BCR)	▽ WL (ACR)	BORING COMPLETED	04/19/10
▽ WL	RIG D50T	FOREMAN HPC	DRILLING METHOD HSA
		CAVE IN DEPTH @ 22.5'	

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CLIENT NCDOT	JOB # 08-6834	BORING # B-6	SHEET 1 OF 1	
PROJECT NAME Lincolnton Equipment Shop		ARCHITECT-ENGINEER		

SITE LOCATION	<input type="checkbox"/> CALIBRATED PENETROMETER TONS/FT. <sup>2</sup> 1 2 3 4 5+ PLASTIC LIMIT %      WATER CONTENT %      LIQUID LIMIT % X-----●-----△ ROCK QUALITY DESIGNATION & RECOVERY RQD%-----REC.%----- 20% 40% 60% 80% 100% <input checked="" type="checkbox"/> STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50+
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THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL GNE	WS OR	BORING STARTED	04/19/10
▽ WL(BCR)	▽ WL(ACR)	BORING COMPLETED	04/19/10
▽ WL	RIG D50T	FOREMAN HPC	DRILLING METHOD HSA

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CLIENT NCDOT	JOB # 08-6834	BORING # B-7	SHEET 1 OF 1	
PROJECT NAME Lincolnton Equipment Shop		ARCHITECT-ENGINEER		

SITE LOCATION

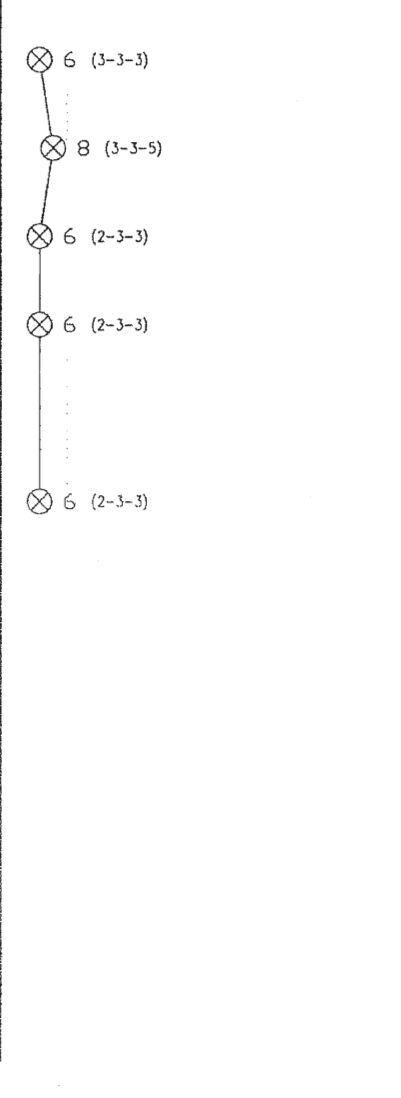
○ CALIBRATED PENETROMETER  
TONS/FT.²  
1 2 3 4 5+

PLASTIC LIMIT %      WATER CONTENT %      LIQUID LIMIT %  
X-----●-----△

ROCK QUALITY DESIGNATION & RECOVERY  
RQD% --- REC.% ---  
20% 40% 60% 80% 100%

⊗ STANDARD PENETRATION  
BLOWS/FT.  
10 20 30 40 50+

DEPTH (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	ENGLISH UNITS	WATER LEVELS ELEVATION (FT)
					BOTTOM OF CASING	LOSS OF CIRCULATION 100%	
					SURFACE ELEVATION 487		
0					Topsoil Depth 5"		
1	1	SS	18	15	RESIDUAL - Medium Stiff, Orangish Red, Moist, Silty CLAY, (CH)		485
5	2	SS	18	18	Loose, Brownish Red, Moist, Silty Fine SAND with Mica, (SM)		
	3	SS	18	17			
10	4	SS	18	17	Loose, Brown, Moist, Silty Fine SAND with Mica, (SM)		480
15	5	SS	18	15			475
					END OF BORING @ 15.0'		470
20							465
25							460
30							



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

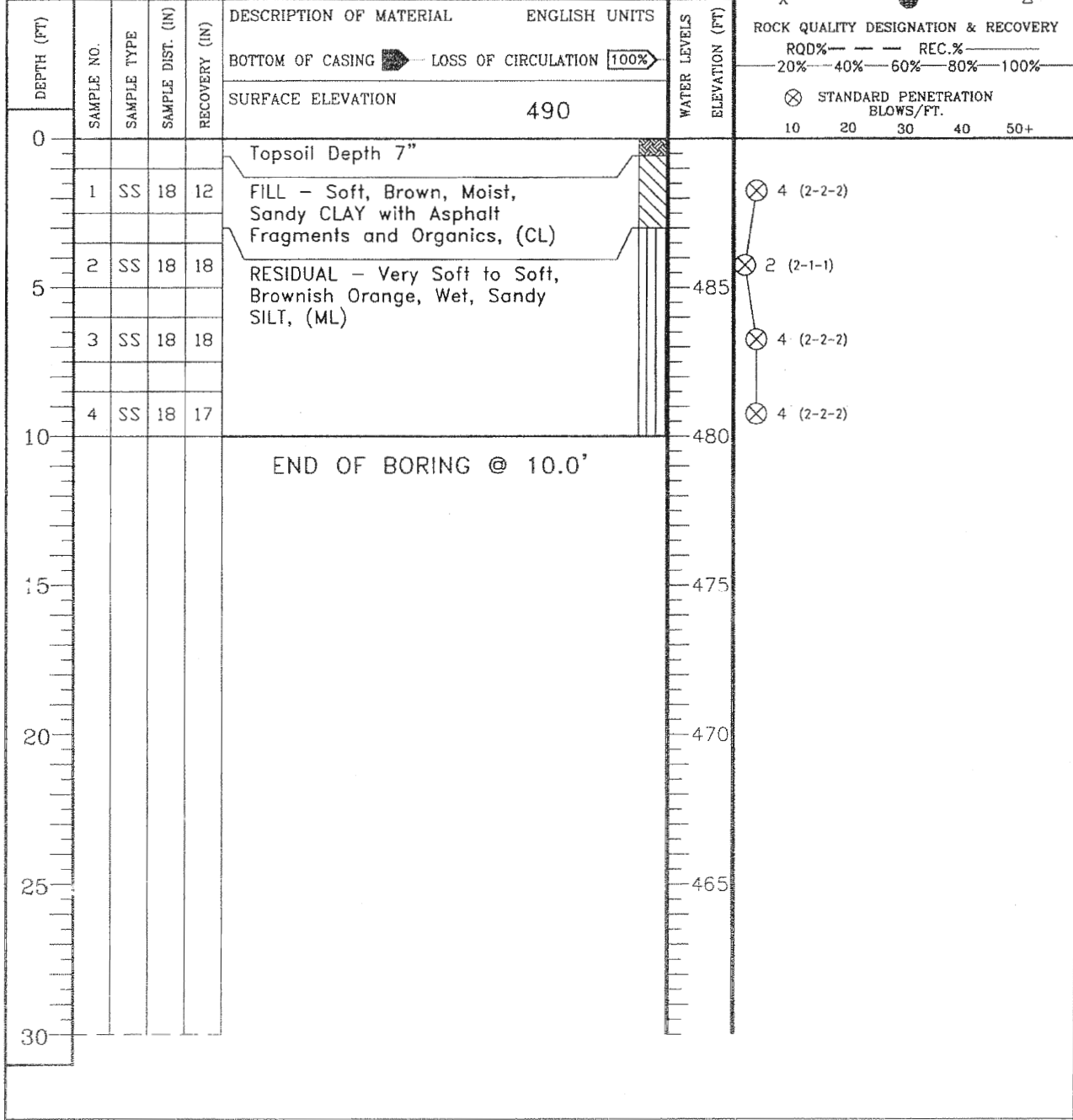
▽ WL GNE	WS OR	BORING STARTED	04/19/10
▽ WL(BCR)	▽ WL(ACR)	BORING COMPLETED	04/19/10
▽ WL	RIG D50T	FOREMAN HPC	DRILLING METHOD HSA

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CLIENT NCDOT	JOB # 08-6834	BORING # B-8	SHEET 1 OF 1	
PROJECT NAME Lincolnton Equipment Shop		ARCHITECT-ENGINEER		

SITE LOCATION		CALIBRATED PENETROMETER TONS/FT. <sup>2</sup> 1 2 3 4 5+
		PLASTIC LIMIT % X-----Δ WATER CONTENT % ● LIQUID LIMIT %



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL GNE	WS OR	BORING STARTED	04/19/10
▽ WL (BCR)	▽ WL (ACR)	BORING COMPLETED	04/19/10
▽ WL		RIG D50T FOREMAN HPC	DRILLING METHOD HSA

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## Laboratory Test Summary

Project Name: Lincolnton Equipment Shop

Project No.: 6834

Project Location: Lincolnton, NC

Boring Location	Depth (ft)	Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS
B-5	S-1	31.2				
B-5	S-5	47.3				
B-5	S-6	53.5				
B-7	S-1	28.6	59	29	30	CH
B-8	S-2	22.3				

## DIVISION 3 – CONCRETE

### SECTION 03300 - CAST-IN-PLACE CONCRETE

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Elevated concrete slabs.
- C. Floors and slabs on grade.
- D. Concrete foundations and anchor bolts for pre-engineered building.
- E. Concrete reinforcement.
- F. Joint devices associated with concrete work.
- G. Miscellaneous concrete elements, including equipment pads and manholes.
- H. Concrete curing.

##### 1.02 REFERENCES

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 1997).
- B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 1996.
- C. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International; 1996.
- D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 1989 (Reapproved 1997).
- E. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 1991.
- F. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 1988.
- G. ACI 308 - Standard Practice for Curing Concrete; American Concrete Institute International; 1992 (Reapproved 1997).
- H. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International; 1995.
- I. ASTM A 185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement; 1997.
- J. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 1996a.
- K. ASTM C 33 - Standard Specification for Concrete Aggregates; 1997.
- L. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 1996.
- M. ASTM C 94 - Standard Specification for Ready-Mixed Concrete; 1998.
- N. ASTM C 150 - Standard Specification for Portland Cement; 1997a.
- O. ASTM C 173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 1994a.
- P. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete; 1997.
- Q. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 1998a.
- R. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 1997.
- S. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 1983 (reapproved 1991).
- T. COE CRD-C 513 - COE Specifications for Rubber Waterstops; Corps of Engineers; 1974.

##### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products.

##### 1.04 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

## PART 2 PRODUCTS

### 2.01 FORMWORK

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
  - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
  - 2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
  - 3. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

### 2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420).
  - 1. Deformed billet-steel bars.
  - 2. Unfinished.
- B. Welded Steel Wire Fabric: ASTM A 185, plain type.
  - 1. Flat Sheets.
  - 2. Mesh Size and Wire Gage: As indicated on drawings.
- C. Reinforcement Accessories:
  - 1. Tie Wire: Annealed, minimum 16 gage.
  - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
  - 3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

### 2.03 CONCRETE MATERIALS

- A. Cement: ASTM C 150, Type I - Normal Portland type.
- B. Fine and Coarse Aggregates: ASTM C 33.
- C. Water: Clean and not detrimental to concrete.

### 2.04 ADMIXTURES

- A. Air Entrainment Admixture: ASTM C 260.
- B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1% by weight of cement.

### 2.05 CONCRETE ACCESSORIES

- A. Vapor Retarder: 6 mil thick clear polyethylene film, type recommended for below grade application.
- B. Non-Shrink Grout: ASTM C 1107; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
  - 1. Minimum Compressive Strength at 48 Hours: 2,400 psi.
  - 2. Minimum Compressive Strength at 28 Days: 7,000 psi.
- C. Liquid Curing Compound: ASTM C 309, Type 1, clear or translucent, compatible with finished flooring.

### 2.06 JOINT DEVICES AND MATERIALS

- A. Waterstops: Rubber type, COE CRD-C 513.
- B. Joint Filler: ASTM D 1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick; tongue and groove profile.
- C. Construction Joint Devices: Integral galvanized steel; 1/8 inch thick, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge.

### 2.07 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
  - 1. For trial mixtures method, employ independent testing agency acceptable to Designer for preparing and reporting proposed mix designs.
- C. Normal Weight Concrete:
  - 1. Compressive Strength, per ASTM C 39 at 28 days: 3,000 psi.
  - 2. Fly Ash is not permitted.

# LINCOLNTON EQUIPMENT SHOP

3. Water-Cement Ratio: Maximum 40 percent by weight.
4. Total Air Content: 4 percent, per ASTM C 173.
5. Maximum Slump: 4 inches.

## 2.08 MIXING

- A. Transit Mixers: Comply with ASTM C 94.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

### 3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches and seal watertight by taping edges and ends. Cover with sand to depth shown on drawings.

### 3.03 INSTALLING REINFORCEMENT

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install wire fabric in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

### 3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Notify Designer not less than 24 hours prior to commencement of placement operations.
- D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- E. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.
- F. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.
- G. Install joint devices in accordance with manufacturer's instructions.
- H. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- I. Place concrete continuously between predetermined expansion, control, and construction joints.
- J. Screed floors level, maintaining surface flatness of maximum 1/8 inch in 10 ft.

### 3.05 CONCRETE FINISHING

- A. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
  1. Steel trowel surfaces that will receive carpeting, resilient flooring, and thin set quarry tile.
  2. Steel trowel surfaces that will be left exposed.
- B. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:50 nominal.

### 3.06 CURING AND PROTECTION

- A. Comply with requirements of ACI 308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Surfaces Not in Contact with Forms:
  1. Start initial curing as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
  2. Begin final curing after initial curing but before surface is dry.
    - a. Curing compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

**3.07 FIELD QUALITY CONTROL**

- A. NCDOT's testing agency will perform field quality control tests, as specified in Section 01400.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- D. Compressive Strength Tests: ASTM C 39. For each test, mold and cure five concrete test cylinders. Obtain test samples for every 50 cu yd or less of each class of concrete placed.
- E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- F. Perform one slump test for each set of test cylinders taken.

**3.08 DEFECTIVE CONCRETE**

- A. Repair or replacement of defective concrete will be determined by the Designer. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

**END OF SECTION**

## DIVISION 4 – MASONRY

### SECTION 04255 - MASONRY SYSTEMS PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Includes:
  - 1. Concrete masonry foundation.
  - 2. Concrete masonry units.
  - 3. Mortar and grout.
  - 4. Reinforcement, anchorage, and accessories.

#### 1.02 SUBMITTALS

- A. Product Data: Submit published data from manufacturers of products and accessories specified, indicating compliance with requirements.

#### 1.03 QUALITY ASSURANCE

- A. Fire Ratings: Where fire-rated masonry construction is indicated or required, provide materials and construction methods identical to those of assemblies tested in accordance with ASTM E 119 for hourly ratings required. Provide evidence acceptable to governing authority that proposed construction complies with fire performance requirements.
- B. Mock-up: Prior to commencement of exposed masonry work, erect sample panel to serve as standard of appearance and workmanship throughout construction period.
  - 1. Build as part of the building wall, erect to the design indicated on drawings, and review with the architect at the start of the masonry above the slab elevation.

### PART 2 - PRODUCTS

#### 2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards for types required, and as follows:
  - 1. Size: Standard Smooth-Face and Single-Scored **Paint Grade** units and Standard units with nominal dimensions of 16 inches long, 8 inches high, and 8 inches thick (15-5/8 by 7-5/8 by 7-5/8 actual).
  - 2. Smooth-Face and Single-Scored Units shall be Paint Grade or Medium Density units, equal to Adams Products, Fay Block Co., or Johnson Concrete Co.
  - 3. Special shapes: Provide special block types where required for corners, control joints, headers, lintels, bond beams, and other special conditions, whether or not specifically indicated on the drawings as special.
  - 4. Hollow load-bearing units: ASTM C 90, and as follows:
    - a. Type I: Moisture-controlled units.
    - b. Medium and Normal weight.
    - c. Exposed faces: Manufacturer's standard.

#### 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. For grout use ASTM C 404.
- 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; Hot-dip galvanizing (after fabrication): ASTM A 153, Class B-2. 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.

# LINCOLN TON EQUIPMENT SHOP

## 2.04 MISCELLANEOUS MASONRY ACCESSORIES

- A. Expansion Joint Strips: Neoprene filler strips complying with ASTM D 1056, Classification 2 A1, capable of 35 percent compression and sized for specific conditions indicated.
- B. Bond Breaker Strips: ASTM D 226, Type I; No. 15 asphalt felt.
- C. Sealant and Backer Rod: As specified in Division 7.
- D. Structural Steel Members: ASTM A 36/A 36M. Fabricate structural steel members in accordance with AISC "ASD Manual of Steel Construction".
- E. Anchor Bolts: ASTM A 307, Grade C.
- F. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C 1107 and capable of developing a minimum compressive strength of 7,000 psi at 28 days. Shop and Touch-Up Primer: Fabricator's standard.

## 2.05 MASONRY CLEANER

- A. Detergent Solution: Job-mixed solution of ½ cup trisodium phosphate and ½ cup laundry Detergent per gallon of water.

## 2.06 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C 270, Proportion Specification.
  - 1. Limit cementitious materials to lime and portland cement.
  - 2. Masonry below grade and in contact with earth: Type S.
  - 3. Locations indicated on the drawings: Type S.
  - 4. Applications as follows: Type S.
    - a. Exterior, above-grade walls.
    - b. Locations for which another mortar type has not been specifically indicated.
- B. Grout: 3,000 psi, ASTM C 476; provide consistency required at time of placement to fill completely all spaces indicated to be grouted. Use grout in spaces 4 inches or more in least horizontal dimension.

# PART 3 - EXECUTION

## 3.01 INSTALLATION PROCEDURES

- A. Cutting: Where cutting is required, use power saws to provide clean, sharp, unchipped edges.
  - 1. Do not use wet cutting techniques with concrete unit masonry.

## 3.02 MASONRY CONSTRUCTION - GENERAL

- A. Pattern Bond: Lay exposed masonry in running bond except where other bonds are indicated at special features.
  - 1. Lay concealed masonry in running bond, or lap units at least 8 inches.
- B. Expansion and Control Joints: Build in movement joints where indicated, installing accessory items as masonry is constructed.
  - 1. Leaving joints completely open for subsequent installation of backer rod and sealant, or installing compressible filler material as backing for sealant.

## 3.03 LAYING MASONRY UNITS

- A. Solid Masonry Units: Install in full bed joints and with head joint completely filled prior to laying each unit; do not slush head joints.
- B. Hollow Masonry Units: Install so that face shells are solidly mortared, horizontally and vertically. Bed webs solidly in mortar at starting course.
- C. Joints: Make mortar joints visually and dimensionally consistent.
  - 1. Except as otherwise indicated, maintain mortar joint widths of 3/8 inch.
- D. Exposed Joints: Using concave jointer slightly larger than joint width at all interior concrete masonry units, rake vertical joints 3/8" deep and weathered joints at all horizontal joints, and tool exposed joints before mortar has assumed final set.

## 3.04 INSTALLING CONCEALED MASONRY FLASHING

- A. Sealing: Seal all joints in optional flexible flashing to assure watertight integrity.
  - 1. Lap end joints of flexible flashings at least 4 inches; seal in accordance with manufacturer's instructions.



**3.05 CLEANING AND PROTECTION**

- A. Clean masonry after mortar is thoroughly set and cured.
  - 1. Scrape off adhered mortar particles by hand, using non-metallic tools.
  - 2. Before applying cleaning solution, saturate masonry surfaces with water; rinse thoroughly immediately after cleaning.
  - 3. Use bucket and brush hand-cleaning method described in BIA Technical Notes No. 20 Revised for brick masonry, except use detergent mixture only.
  - 4. 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.
- C. Use non-metallic tools in cleaning operations.

**END OF SECTION 04255**

## DIVISION 5 – METALS

### SECTION 05120 - STRUCTURAL STEEL

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Structural steel framing members, support members and struts.
- B. Grouting under base plates.

##### 1.02 RELATED SECTIONS

- A. Section 05210 - Steel Joists.
- B. Section 05310 - Steel Deck: Support framing for small openings in deck.
- C. Section 05510 - Metal Stairs: Steel stairs affecting structural steel work.

##### 1.03 REFERENCES

- A. AISC M016 - ASD Manual of Steel Construction; American Institute of Steel Construction, Inc.; 1989, Ninth Edition.
- B. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 1992.
- C. AISC S329 - Allowable Stress Design Specification for Structural Joints Using ASTM A325 or A490 Bolts; American Institute of Steel Construction, Inc.; 1985, Reaffirmed 1994.
- D. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 1997a.
- E. ASTM A 108 - Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality; 1999.
- F. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 1997.
- G. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 1997.
- H. ASTM A 325M - Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric); 1997.
- I. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 1999.
- J. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 1999.
- K. ASTM A 514/A 514M - Standard Specification for High-Yield Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding; 1996.
- L. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 1999.
- M. ASTM F 959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners; 1999a.
- N. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2000.

##### 1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
  - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.

##### 1.05 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC "ASD Manual of Steel Construction".

#### PART 2 PRODUCTS

##### 2.01 MATERIALS

- A. Structural Steel Members: ASTM A 36/A 36M.
- B. Cold-Formed Structural Tubing: ASTM A 500, Grade B.
- C. Hot-Formed Structural Tubing: ASTM A 501, seamless or welded.
- D. Steel Plate: ASTM A 514/A 514M.
- E. Shear Stud Connectors: Made from ASTM A 108 Grade 1015 bars.

## LINCOLN TON EQUIPMENT SHOP

- F. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, medium carbon, galvanized.
- G. Anchor Bolts: ASTM A 307, Grade C.
- H. Load Indicator Washers: Provide washers complying with ASTM F 959 at all connections requiring high-strength bolts.
- I. Welding Materials: AWS D1.1; type required for materials being welded.
- J. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C 1107 and capable of developing a minimum compressive strength of 7,000 psi at 28 days. Shop and Touch-Up Primer: Fabricator's standard.

### 2.02 FABRICATION

- A. Shop fabricate to greatest extent possible.

### 2.03 FINISH

- A. Shop prime structural steel members. Do not prime surfaces that will be field welded, in contact with concrete, or high strength bolted.

### 2.04 SOURCE QUALITY CONTROL AND TESTS

- A. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with AISC "Allowable Stress Design Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 25 percent of bolts at each connection.
- B. Welded Connections: Visually inspect all shop-welded connections .

## PART 3 EXECUTION

### 3.01 ERECTION

- A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".
- B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Field weld components and shear studs indicated on shop drawings.
- D. Do not field cut or alter structural members without approval of Designer.
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- F. Grout solidly between bearing plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

### 3.02 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

## END OF SECTION

## SECTION 05310 - STEEL DECK

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Metal composite deck.
- B. Supplementary framing for openings up to and including 18 inches.
- C. Misc deck accessories.

#### 1.02 REFERENCES

- A. ASTM A 108 - Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality; 1999.
- B. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1999a.
- C. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2000.
- D. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society; 1998.
- E. SDI (DM) - Publication No. 29, Design Manual for Composite Decks, Form Decks, Roof Decks and Cellular Floor Deck Systems with Electrical Distribution; Steel Deck Institute; 1995.
- F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); The Society for Protective Coatings; 1991 (Part of Steel Structures Painting Manual, Vol. Two).

#### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittals procedures.
- B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, cellular raceways and outlet box locations, pertinent details, and accessories.
- C. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.

#### 1.04 QUALITY ASSURANCE

- A. Design deck layout, spans, fastening, and joints under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in North Carolina.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.
- B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Steel Deck:
  - 1. United Steel Deck, Inc.
  - 2. Vulcraft Steel Deck.
  - 3. Wheeling Corrugating Co.
  - 4. Substitutions: See Section 01600 - Product Requirements.

#### 2.02 STEEL DECK

- A. Metal Composite Deck: Corrugated sheet steel:
  - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
  - 2. Minimum Metal Thickness, Excluding Finish: 22 gage.
  - 3. Nominal Height: 1-1/2 inch.
  - 4. Formed Sheet Width: 30 or 36 inch.
  - 5. Side Joints: Lapped, screwed.
  - 6. End Joints: Lapped, welded or screwed, see plans.

#### 2.03 ACCESSORY MATERIALS

- A. Welding Materials: AWS D1.1.
- B. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.

## LINCOLNTON EQUIPMENT SHOP

- C. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On steel supports provide minimum 3 inch bearing.
- C. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute and at each transverse flute using methods specified.
  - 1. Welding: Use fusion welds through weld washers.
- D. At welded side laps weld at each bar joist bearing.
- E. Weld deck in accordance with AWS D1.3.
- F. At deck openings from 6 inches to 18 inches in size, provide 2 x 2 x 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.
- G. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary without distortion.
- H. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.
- I. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

### END OF SECTION

## SECTION 05510 - METAL STAIRS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Structural steel stair framing and supports.
- B. Pan treads to receive concrete fill.

#### 1.02 RELATED SECTIONS

- A. Section 05520 - Handrails and Railings: Metal handrails and balusters other than specified in this section.

#### 1.03 REFERENCES

- A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 1997a.
- B. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 1999b.
- C. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 1998.
- D. ASTM A 283/A 283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 1998.
- E. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 1997.
- F. ASTM A 325M - Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric); 1997.
- G. ASTM A 786/A 786M - Standard Specification for Rolled Steel Floor Plates; 1993.
- H. ASTM E 935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 1993 (Reapproved 1998).
- I. ASTM E 985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 1996.
- J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 1998.
- K. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2000.
- L. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1991 (Part of Steel Structures Painting Manual, Vol. Two).
- M. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; 1995 (Part of Steel Structures Painting Manual, Vol. Two).

#### 1.04 DESIGN REQUIREMENTS

- A. Design and fabricate stair assembly to support a uniform live load of 100 lb/sq ft and a concentrated load of 300 lb/sq ft with deflection of stringer or landing framing not to exceed 1/180 of span. Test in accordance with ASTM A 935.
- B. Design and fabricate railing assemblies in accordance with ASTM E 985.

#### 1.05 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
  - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

#### 1.06 QUALITY ASSURANCE

- A. Perform design and prepare shop drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the place where the Project is located.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Steel Sections: ASTM A 36/A 36M.
- B. Steel Plates: ASTM A 36 / A 36M.
- C. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.

## LINCOLNTON EQUIPMENT SHOP

- D. Checkered Plate: ASTM A 786/A 786M, rolled steel floor plate.
- E. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M) galvanized to ASTM A 153/A 153M for galvanized components.
- F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; consistent with design of stair structure.
- G. Welding Materials: AWS D1.1; type required for materials being welded.
- H. Shop and Touch-Up Primer: SSPC-Paint 15, Type I - Red Oxide.

### 2.02 COMPONENTS

- A. Metal Pan Stair Treads: Concrete in metal pan; 12 inches deep; smooth surface; non-slip edge.
- B. Concrete: Type specified in Section 03300.

### 2.03 FABRICATION - GENERAL

- A. Fit and shop assemble components in largest practical sections, for delivery to site.
- B. Fabricate components with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- F. Fabricate components accurately for anchorage to each other and to building structure.

### 2.04 FABRICATION - PAN STAIRS

- A. Form treads and risers with minimum 12 gage sheet steel stock.
- B. Secure reinforced tread pans to stringers with clip angles; welded in place.
- C. Form stringers with rolled steel channels, 12 inches deep. Weld fascia plates to channels using 12 gage steel sheet across channel toes.
- D. Prime paint components.

### 2.05 FINISHING

- A. Prepare surfaces to be primed in accordance with SSPC-SP 2.
- B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- C. Do not prime surfaces in direct contact with concrete or where field welding is required.
- D. Prime paint items with one coat.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

### 3.02 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

### 3.03 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

## END OF SECTION

## SECTION 05520 - HANDRAILS AND RAILINGS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Steel pipe handrails, and fittings.

#### 1.02 REFERENCES

- A. ASTM A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 1998.
- B. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 1998.
- C. ASTM E 935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 1993.
- D. SSPC-Paint 15 - Steel Joist Shop Paint; The Society for Protective Coatings; 1991 (Part of Steel Structures Painting Manual, Vol. Two).

#### 1.03 DESIGN REQUIREMENTS

- A. Handrails shall be designed and constructed for loads specified in Section 1607.7.1 of the NC State Building Code. Test in accordance with ASTM E 935.

#### 1.04 SUBMITTALS

- A. Section 01300 - Administrative Requirements: Procedures for submittals.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

### PART 2 PRODUCTS

#### 2.01 STEEL RAILING SYSTEM

- A. Pipe: ASTM A 53, Grade B Schedule 40, black finish.
- B. Fittings: Elbows, T-shapes, wall brackets, escutcheons; machined steel.
- C. Mounting: Adjustable Brackets and flanges, with steel inserts for casting in concrete. Prepare backing plate for mounting in masonry wall construction.
- D. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, Type I - Red Oxide.

#### 2.02 FABRICATION

- A. Fit and shop assemble components in largest practical sizes for delivery to site.
- B. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- C. Provide anchors and plates required for connecting railings to structure.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

#### 3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.



## LINCOLN TON EQUIPMENT SHOP

### 3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Anchor railings securely to structure.
- D. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.
- E. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

**END OF SECTION**

## DIVISION 6 – WOOD AND PLASTICS

### SECTION 06410 - CUSTOM CABINETS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Special fabricated cabinet units for the Break Room, and shelving for the Janitor's Closet.
- B. Countertops and steel work bench (see Section 05120 - Structural Steel) for steel plates and sheet metal.
- C. Cabinet hardware.

##### 1.02 REFERENCES

- A. AWI P-200 - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute; 1997, Seventh Edition, Version 1.0.
- B. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 1994 (ANSI/BHMA A156.9).
- C. FS A-A-1936 - Adhesive, Contact, Neoprene Rubber; Federal Specifications and Standards; 1996.
- D. NHLA G-101 - Rules for the Measurement & Inspection of Hardwood & Cypress; National Hardwood Lumber Association; 1998.
- E. PS 1 - Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce); 1995.
- F. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 1999.

##### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.
- C. Product Data: Provide data for hardware accessories.

##### 1.04 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom quality.

##### 1.05 ENVIRONMENTAL REQUIREMENTS

- A. During and after installation of work of this section, maintain the same temperature and humidity conditions in building spaces as will occur after occupancy.

#### PART 2 PRODUCTS

##### 2.01 WOOD MATERIALS

- A. Softwood Lumber: For the Janitor's Closet shelving, NIST PS 20; Graded in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom; average moisture content of 6 percent; species and grade as follows:
  - 1. Exposed Stiles and Rails: Species Pine, Grade No. 2.
- B. Hardwood Lumber: NHLA graded in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom; average moisture content of 6 percent; species and grade as follows:
  - 1. Cabinet Frame: Species Red Oak, Grade plain cut.

##### 2.02 PANEL MATERIALS

- A. Softwood Plywood: Shelving the Janitor's Closet, NIST PS 1; Graded in accordance with AWI Architectural Woodwork Quality Standards Illustrated, core materials of veneer; species and cut as follows:
  - 1. Shelving: Species Pine / Fir, Grade A/C.
- B. Hardwood Plywood: NIST PS 1; graded in accordance with AWI Architectural Woodwork Quality Standards Illustrated, core materials of veneer, type of glue recommended for application; face veneer and cuts as follows:

## LINCOLN TON EQUIPMENT SHOP

1. Door and Drawer Fronts: Species Red Oak, Grade Custom.
2. Drawer Construction: Species Red Oak, Grade Custom.

### 2.03 LAMINATE MATERIALS

- A. Manufacturers:
  1. **Wilson Art\***; Product Surface Textured, or matching colors by Formica or Nevamar Corp.
- B. Plastic Laminate: AWI P-200, 0.039 inch Post Forming quality; **4763-60, Mystique Marsh**, color, pattern, and matte surface texture as selected.

### 2.04 ACCESSORIES

- A. Adhesive: FS A-A-1936 contact adhesive.

### 2.05 HARDWARE

- A. Hardware: BHMA A156.9, Types 1 and 2.
- B. Shelf Standards and Rests: Formed steel channels and rests, cut for fitted rests spaced at 1 inch centers; chrome finish.
- C. Drawer and Door Pulls: "U" shaped pull, aluminum with satin finish, 4 inch centers.
- D. Cabinet Locks: Keyed cylinder, two keys per lock, steel with satin finish.
- E. Catches: Magnetic.
- F. Drawer Slides: Galvanized steel construction, ball bearings separating tracks, full extension type.
- G. Hinges: Knuckle disappearing type, steel with satin finish.

### 2.06 FINISHING MATERIALS

- A. Stain, Shellac, Varnish and Finishing Materials: As specified in Section 09900.

### 2.07 FABRICATION

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- B. Fit shelves, doors, and exposed edges with 3/8 inch matching hardwood edging. Use one piece for full length only.
- C. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- D. Door and Drawer Fronts: 3/4 inch thick; flush style.
- E. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
- F. Apply wood laminate by grain matching adjacent sheets to book matching.
- G. Mechanically fasten back splash to countertops with steel brackets at 16 inches on center.
- H. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

### 2.08 FACTORY FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.
- D. Finish work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Section 1500, System TR-2 (Transparent).

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

### 3.02 INSTALLATION

- A. Set and secure casework in place; rigid, plumb, and level.
- B. Use concealed joint fasteners to align and secure adjoining cabinet units.

## LINCOLNTON EQUIPMENT SHOP

- C. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- D. Secure cabinet to floor using appropriate angles and anchorages.

### 3.03 ADJUSTING

- A. Adjust moving or operating parts to function smoothly and correctly.

### 3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

## END OF SECTION

## DIVISION 7 – THERMAL AND MOISTURE PROTECTION

### SECTION 07115 - BITUMINOUS DAMPPROOFING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Bituminous dampproofing.

##### 1.02 REFERENCES

- A. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 1994.
- B. ASTM D 1227 - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 1995.

##### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide properties of primer, bitumen, and mastics.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

##### 1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with NRCA Waterproofing and Dampproofing Manual, 4<sup>th</sup> Edition, 1996.

##### 1.05 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

#### PART 2 PRODUCTS

##### 2.01 MANUFACTURERS

- A. The Euclid Chemical Company; Product Emulsified Asphalt Semi-Mastic.
- B. Other Acceptable Manufacturers:
  - 1. Karnak Chemical Corp.
  - 2. ChemRex, Inc.
  - 3. W.R. Meadows, Inc.

##### 2.02 COLD ASPHALTIC MATERIALS

- A. Bitumen: Emulsified asphalt, ASTM D 1227; with fiber reinforcement (Type I or II).
  - 1. Product: Equal to #220 AF Fibrated Emulsion Dampproofing manufactured by Karnak Corporation; "Hydrocide 700B Semi-Mastic"; Sonneborn Building Products Division/ChemRex, Inc., "Sealmastic, Type 2-Brush-On or Spray Grade"; W. R. Meadows, Inc.
- B. Asphalt Primer: ASTM D 41, compatible with substrate.
- C. Reinforcing Fabric: Woven or nonwoven glass fiber, treated with organic binders and coated for compatibility with dampproofing bitumen.
- D. Detailing Mastic: Asphalt-based plastic roof cement, trowel consistency, meeting the requirements of ASTM D 4586.

#### PART 3 EXECUTION

##### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.
- C. Verify items which penetrate surfaces to receive dampproofing are securely installed.

**3.02 PREPARATION**

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate.

**3.03 APPLICATION**

- A. Apply bitumen with mop.
- B. Apply bitumen in one coat, continuous and uniform, at a rate of 4-1/2 gal/100 sq ft per coat to provide minimum 30-mil dry film thickness.
- C. Seal items projecting through dampproofing surface with mastic. Seal watertight.

**END OF SECTION**

## SECTION 07212 - BOARD AND BATT INSULATION

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Board insulation at perimeter foundation wall and underside of floor slabs, and at Office and Break Room exterior walls.
- B. Batt insulation in exterior upper wall, clerestory, and gable end construction.

#### 1.02 RELATED SECTIONS

- A. Section 09260 - Gypsum Board Assemblies: Metal stud framing.

#### 1.03 REFERENCES

- A. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 1995.
- B. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 1998.

#### 1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

### PART 2 PRODUCTS

#### 2.01 BOARD INSULATION MATERIALS

- A. Extruded Polystyrene Board Insulation: ASTM C 578, Type VI; Extruded polystyrene board with either natural skin or cut cell surfaces; with the following characteristics:
  - 1. Board Size: 48 x 96 inch.
  - 2. Board Thickness: 1-1/2 inches.
  - 3. Board Edges: Square.
  - 4. Thermal Conductivity (k factor) at 25 degrees F: 0.18; R-value of 8.33.
  - 5. Compressive Resistance: 40 psi.
  - 6. Board Density: 1.3 lb/cu ft.
  - 7. Water Absorption, maximum: 0.3 percent, volume.
  - 8. Manufacturers:
    - a. Dow Chemical Co.
    - b. Owens Corning Corp.
    - c. Tenneco Building Products.
  - 9. Substitutions: See Section 01600 - Product Requirements.

#### 2.02 BATT INSULATION MATERIALS

- A. Batt Insulation: ASTM C 665; preformed glass fiber batt; friction fit, conforming to the following:
  - 1. Thermal Resistance: R of 11 for exterior upper walls.
  - 2. Thickness: 3-1/2 inch.
  - 3. Facing: Unfaced.
  - 4. Manufacturers:
    - a. CertainTeed Corp.
    - b. Johns Manville.
    - c. Owens Corning Corp.
  - 5. Substitutions: See Section 01600 - Product Requirements.

#### 2.03 ACCESSORIES

- A. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

## **PART 3 EXECUTION**

### **3.01 BOARD INSTALLATION AT FOUNDATION PERIMETER**

- A. Install boards horizontally and vertically on foundation and slab perimeter.
  - 1. Butt edges and ends tightly to adjacent boards and to protrusions.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

### **3.02 BOARD INSTALLATION UNDER CONCRETE SLABS**

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

### **3.03 BATT INSTALLATION**

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids; fill all voids between windows and door frames and wood framing.

### **3.04 PROTECTION OF FINISHED WORK**

- A. Do not permit installed insulation to be damaged prior to its concealment.

## **END OF SECTION**



## SECTION 07213 - PRE-ENGINEERED BUILDING INSULATION

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Thermal insulation, interior vapor barrier liner, and support strapping for Pre-Engineered purlin roof installation.
- B. Fasteners and sealants.

#### 1.02 REFERENCES

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 1998.
- B. FS HH-I-558 - Insulation, Blankets, Thermal (Mineral Fiber, Industrial Type); Federal Specifications and Standards; Revision C, 1992.

#### 1.03 PERFORMANCE REQUIREMENTS

- A. Provide insulating system forming a continuous vapor barrier inside of building purlins, girts, and insulation to provide complete isolation from inside conditioned air.

#### 1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's standard details and catalog data demonstrating compliance with referenced standards; installation instructions.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURER

- A. Provide insulation, liner fabric, and accessories fabricated by Thermal Design, Inc., P.O. Box 468, 600 N. Main Street, Madison, NE 68748. Telephone 800-255-0776.
- B. Or equal by Bay Liner Fabric System, 2929 Walker Drive, Greenbay, WI 54308. Telephone 800-445-5947.
- C. Substitutions: See Section 01600 - Product Requirements.

#### 2.02 MATERIALS

- A. Insulation: Fiberglass blanket or batt complying with FS HH-I-558, Form B, Type I; with the following R-value and nominal thickness: R-35, 8" thick between roof purlins with 3" upper roof insulation.
- B. Vapor Barrier Liner Fabric: Woven, reinforced, high-density polyethylene yarns coated on both sides with a continuous white or colored polyethylene film, minimum 3.2 mil thickness.
  1. Permeance of fabric and seams: 0.025 perms.
  2. Flame spread (ASTM E 84): Not more than 25.
  3. Smoke developed (ASTM E 84): Not more than 50.
  4. Size and seaming: Manufactured in large custom pieces by extrusion welding from roll goods, and fabricated to substantially fit defined building area with minimum practicable job site sealing.
  5. Stapled seams not acceptable.
  6. Factory-folded to allow for rapid pull-out on strap support system.
  7. Color: White.
- C. Vapor Barrier Lap Sealant: Fast tack solvent-based, synthetic rubber adhesive.
- D. Vapor Barrier Patch Tape: Double stick sealant tape made from same material as liner fabric.
- E. Straps: Woven polyester plastic.
- F. Fasteners:
  1. For light gage steel: #12 x 3/4 inch plated Tek 2 screws, painted to match specified color.
  2. For heavy gage steel: #12 x 1-1/2 inch plated Tek 2 screws, painted to match specified color.
  3. For wood, concrete, other materials: As recommended by manufacturer.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that building structure and building systems such as electrical conduit to be concealed are completed and approved.
- B. Correct any unsatisfactory conditions before proceeding.

### 3.02 ATTIC INSULATION INSTALLATION

- A. Vapor Barrier Fabric: Install at underside of purlins.
  - 1. Position pre-folded fabric on the strap platform along one eave purlin.
  - 2. Clamp the two bottom corners at the eave and also centered on the bay.
  - 3. Pull the other end of the pleat-folded fabric across the building width on the strap platform, fasten the straps and fabric in position at the purlin.
  - 4. Once positioned, install fasteners from the bottom side at each strap/purlin intersection.
  - 5. Trim edges and seal along the rafters.
- B. Insulation: 8" thick, R-25, install between purlins.
  - 1. Unpack and shake to a thickness exceeding the specified thickness.
  - 2. Ensure that cavities are filled completely with insulation.
  - 3. Place on the vapor barrier liner fabric without voids or gaps.
  - 4. Place top layer of insulation over and perpendicular to the purlins without voids or gaps, as vapor barrier is applied. Continue and attach the insulation and vapor barrier to the adjacent existing wood attic plywood deck.

### 3.03 CLEANING

- A. Remove scraps and debris from the site.

## END OF SECTION

## SECTION 07900 - JOINT SEALERS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Sealants and joint backing.

#### 1.02 REFERENCES

- A. ASTM C 834 - Standard Specification for Latex Sealants; 1995.
- B. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 1998.
- C. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 1991 (Reapproved 1995).

#### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant performance criteria and color availability.

#### 1.04 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

#### 1.05 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Silicone Sealants:
  - 1. Dow Corning Corp.; Product 795.
  - 2. Substitutions: GE or Sonoborn equivalents.

#### 2.02 SEALANTS

- A. General Purpose Exterior Sealant: Silicone; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.
  - 1. Color: Standard colors matching finished surfaces of adjacent masonry units.
  - 2. Product: **795 manufactured by Dow Corning**.
  - 3. Applications: Use for:
    - a. Joints between metal frames and other materials.
    - b. New windows and door frames.
    - c. Other exterior joints for which no other sealant is indicated.
- B. General Purpose Interior Sealant: Silicone emulsion latex; ASTM C 834, single component, paintable.
  - 1. Color: Standard colors matching finished surfaces; "Gray" and "Dusty Rose".
  - 2. Product: Silicone Latex manufactured by Dow Corning.
  - 3. Applications: Use for:
    - a. Joints between door and window frames and wall surfaces.
    - b. Other interior joints for which no other type of sealant is indicated.
- C. Bathtub/Tile Sealant: White silicone; ASTM C 920, Uses I, M and A; single component, mildew resistant.
  - 1. Product: Bathtub Silicone manufactured by Dow Corning.
  - 2. Applications: Use for:
    - a. Joints between plumbing fixtures and floor and wall surfaces.
    - b. Joints between kitchen and bath countertops and wall surfaces.
    - c. Corners of ceramic tile glazed walls.
- D. Floor Sealant: One-part, self leveling silicone; ASTM C 920 or C 719, Use T.
  - 1. Product: NS Silicone manufactured by Dow Corning.

## LINCOLNTON EQUIPMENT SHOP

2. Applications: Use for floor and apron control / expansion joints in all Work bays, Wash Bay, restrooms, and exterior aprons.

### PART 3 EXECUTION

#### 3.01 PREPARATION

- A. Remove loose materials and foreign matter which might impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

#### 3.02 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C 1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Tool joints concave.

#### 3.03 CLEANING

- A. Clean adjacent soiled surfaces.

#### 3.04 PROTECTION OF FINISHED WORK

- A. Protect sealants until cured.

### END OF SECTION

## DIVISION 8 – DOORS AND WINDOWS

### SECTION 08110 - STEEL DOORS AND FRAMES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Non-fire-rated steel doors and frames.
- B. Thermally insulated steel doors.

##### 1.02 RELATED SECTIONS

- A. Section 08800 - Glazing: Glass for doors and borrowed lites.

##### 1.03 REFERENCES

- A. NC State Building Code, ANSI A117.1, Accessibility.
- B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 1998.
- C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998.
- D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1998.
- E. ASTM C 236 - Standard Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box; 1989 (Reapproved 1993).
- F. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; current edition (ANSI/DHI A115 Series).
- G. NAAMM HMMA 840 - Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 1987.

##### 1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

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

- A. Store in accordance with NAAMM HMMA 840.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

#### PART 2 PRODUCTS

##### 2.01 MANUFACTURERS

- A. Steel Doors and Frames:
  - 1. Ceco Door Products.
  - 2. Steelcraft Manufacturing Co.
    - 1. Curries Company/Essex Industries, Inc.
    - 2. D&D Specialties Inc.
  - 5. Substitutions: See Section 01600 - Product Requirements.

##### 2.02 DOORS AND FRAMES

- A. Requirements for All Doors and Frames:
  - 1. Wind Load: Comply with requirements of ASCE 7-05, for components and cladding
  - 2. Door Top Closures: Flush with top of faces and edges.
  - 3. Door Edge Profile: Beveled on both edges.
  - 4. Door Texture: Smooth faces.
  - 5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
  - 6. Hardware Preparation: In accordance with DHI A115 Series, with reinforcement welded in place, in addition to other requirements specified in door grade standard.

## LINCOLNTON EQUIPMENT SHOP

7. Galvanizing for exterior units: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
  8. Finish: Factory primed, for field finishing.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

### 2.03 STEEL DOORS

- A. Exterior Doors:
1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless, 16 gage.
  2. Core: Polystyrene foam.
  3. Top Closures for Outswinging Doors: Flush with top of faces and edges.
  4. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, manufacturer's standard coating thickness.
  5. Texture: Smooth faces.
  6. Insulating Value: U-value of 0.13, when tested in accordance with ASTM C 236.
  7. Weatherstripping: Separate, see Section 08710.
- B. Interior Doors, Non-Fire-Rated:
1. Grade: ANSI A250.8 Level 2, physical performance Level B, Model 1, full flush, 18 gage.
  2. Core: Cardboard honeycomb.
  3. Thickness: 1-3/4 inches.
  4. Texture: Smooth faces.

### 2.04 STEEL FRAMES

- A. General:
1. Comply with the requirements of grade specified for corresponding door, except:
    - a. ANSI A250.8 Level 1 Doors: 16 gage frames at interior doors.
    - b. ANSI A250.8 Level 3 Doors: 14 gage frames at exterior doors.
  2. Finish: Same as for door.
  3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- B. Exterior Door Frames: Face welded, seamless with joints filled.
1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, manufacturer's standard coating thickness.
  2. Weatherstripping: Separate, see Section 08710.
- C. Interior Door Frames, Non-Fire-Rated: Face welded type.

### 2.05 ACCESSORY MATERIALS

- A. Glazing: 1" thick at exterior and 1/4" thick at interior field installed.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Grout for Exterior Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.
- D. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
- E. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

### 2.06 FINISH MATERIALS

- A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating at all exterior frame interiors.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

## LINCOLNTON EQUIPMENT SHOP

### 3.02 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. Coordinate frame anchor placement with wall construction.
- C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- D. Coordinate installation of hardware.
- E. Coordinate installation of glazing.

### 3.03 ERECTION TOLERANCES

- A. Clearances Between Door and Frame: As specified in ANSI A250.8.
- B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

### 3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.

### 3.05 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

## END OF SECTION

## SECTION 08360 - OVERHEAD DOORS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware and supports.
- C. Electrical controls.

#### 1.02 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry: Rough wood blocking for door opening.

#### 1.03 REFERENCES

- A. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1999a.
- B. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference; 1997.
- C. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors; Door & Access Systems Manufacturers' Association, International; 1996.
- D. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association; 1998.
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; 1999.

#### 1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, installation details and lift clearances.
- C. Product Data: Provide component construction, anchorage method, hardware, and operation manual.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

#### 1.05 QUALITY ASSURANCE

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified.

#### 1.06 WARRANTY

- A. Correct defective Work within a one year period after Project Acceptance.
- B. Provide five year manufacturer warranty for electric operating equipment.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. **Overhead Door Co.; Product Series 424.**
- B. Other Acceptable Manufacturers:
  - 1. Fimbel Door Corp.
  - 2. Wayne-Dalton Corp.
  - 3. Substitutions: See Section 01600 - Product Requirements.

#### 2.02 STEEL DOOR COMPONENTS

- A. Steel Doors: Flush steel, 24 gage, non-insulated ribbed door panels; high lift operating style with track and hardware; complying with DASMA 102, Commercial application.
  - 1. Performance: Withstand positive and negative wind loads equal to lateral wind loads specified by the NC State Building Code using the coefficients for components and cladding without damage or permanent set, when tested in accordance with ASTM E 330, using 10 second duration of maximum load. Comply with requirements of ASCE 7-05, for components and cladding.
  - 2. Door Nominal Thickness: 2 inches thick.
  - 3. Exterior Finish: Prime paint for finish specified in Section 09900.
  - 4. Interior Finish: Pre-finished with baked-on epoxy of white color.



## LINCOLNTON EQUIPMENT SHOP

5. Glazed Lights: Full panel width, 3- row; set in place with resilient glazing channel.
6. Operation: Electric.
- B. Door Panels: Flush steel construction; outer steel sheet of 0.058 inch thick, v-grooved profile; inner steel sheet of 0.058 inch thick, flat profile; core reinforcement of 1-3/4 inch thick sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; insulated.
- C. Glazing: Double strength clear glass, manufacturer's standard full glazing panels.

### 2.03 DOOR COMPONENTS

- A. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; 3" floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
- B. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables with chain hoist.
  1. For Manual Over-ride Operation: Requiring maximum exertion of 25 lbs force to open.
- C. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- D. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- E. Head Weatherstripping: EPDM rubber seal, one piece full length.
- F. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- G. Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.

### 2.04 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A 653/A 653M, with G60/Z180 coating, plain surface.
- B. Insulation: Fibrous glass batt, unfaced, bonded to facing.
- C. Metal Primer Paint: Zinc molybdate type.

### 2.05 ELECTRICAL OPERATION

- A. Electrical Characteristics:
- B. Motor: NEMA MG1, Type 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.
- E. Electric Operator: Side mounted on cross head shaft, adjustable safety friction clutch; brake system actuated by independent voltage solenoid controlled by motor starter; enclosed gear driven limit switch; enclosed magnetic cross line reversing starter; mounting brackets and hardware.
- F. Safety Edge: At bottom of door panel, full width; electro-mechanical sensitized type, wired to reverse door upon striking object; hollow neoprene covered to provide weatherstrip seal.
- G. Control Station: Standard three button (open-close-stop) momentary type control for each electric operator.
  1. 24 volt circuit.
  2. Surface mounted.
  3. Locate at inside door jamb.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

### 3.02 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.

## LINCOLNTON EQUIPMENT SHOP

- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- F. Install perimeter trim.

### 3.03 ERECTION TOLERANCES

- A. Maximum Variation from Plumb: 1/16 inch.
- B. Maximum Variation from Level: 1/16 inch.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

### 3.04 ADJUSTING

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.
- B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to door assembly for specified operation.

### 3.05 CLEANING AND PROTECTION

- A. Clean doors, frames and glazing.
- B. Remove temporary labels and visible markings.
- C. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

## END OF SECTION

## SECTION 08520 - ALUMINUM WINDOWS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Extruded aluminum windows with fixed sash and operating sash (see Alternate 1-Clerestory).
- B. Factory glazing, operating hardware, and insect screens.

#### 1.02 REFERENCES

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 1998.
- B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 1997.
- C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 1998 (Pub. 2000).
- D. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 1997a.
- E. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 1996.
- F. ASTM B 221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 1996.
- G. 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.
- H. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference; 1997.

#### 1.03 PERFORMANCE REQUIREMENTS

- A. Performance Requirements: As specified in PART 2, with the following additional requirements:
- B. Design and size windows to withstand the following load requirements, when tested in accordance with ASTM E 330 using test loads equal to 1.5 times the design wind loads with 10 second duration of maximum load:
  - 1. Design Wind Loads: Comply with requirements of ASCE 7-05, for components and cladding.
  - 2. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
- C. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
- D. Thermal Resistance of Vision and Framing Areas: R of 1.85.
- E. Air Infiltration: Limit air infiltration through assembly to 0.3 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E 283.
- F. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 2.86 lbf/sq ft.
- G. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, or migrating moisture occurring within system.

#### 1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions.
- C. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, operating hardware, and installation requirements.
- D. Certificates: Certify that windows meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer and Installer: Company specializing in fabrication of commercial aluminum windows of types required, with not fewer than three years of experience.

# LINCOLNTON EQUIPMENT SHOP

## 1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

## 1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and 24 hours after installation of sealants.

## 1.08 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.
- B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. TRACO; Product TR-2500 / TR-2800: [www.traco.com](http://www.traco.com).
- B. Other Acceptable Manufacturers:
  - 1. Fleetwood Aluminum Products, Inc; Product 5000T: [www.fleetwoodusa.com](http://www.fleetwoodusa.com).
  - 2. Peerless Products, Inc; Product 1601: [www.peerlessproducts.com](http://www.peerlessproducts.com).
  - 3. Substitutions: See Section 01600 - Product Requirements.

### 2.02 WINDOWS

- A. Windows: Single thickness aluminum sections, factory fabricated, factory finished, thermally broken, vision glass, related flashings, anchorage and attachment devices.
  - 1. Performance Requirements: AAMA/NWWDA 101/I.S.2 R15
- B. Fixed, Non-Operable Type:
  - 1. Construction: Thermally broken.
  - 2. Glazing: Double; clear; low-e.
  - 3. Exterior Finish: Class I natural anodized.
  - 4. Interior Finish: Class I natural anodized.
- C. Horizontal Pivoting Type:
  - 1. Construction: Thermally broken.
  - 2. Provide screens.
  - 3. Glazing: Double; clear; low-e.
  - 4. Exterior Finish: Class I natural anodized.
  - 4. Interior Finish: Class I natural anodized.

### 2.03 COMPONENTS

- A. Frames: 2 inch wide x 2 inch deep profile, of 1/8 inch thick section; thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.
- B. Sills: 1/8 inch thick, extruded aluminum; sloped for positive wash; fit under sash leg to 1/2 inch beyond wall face; one piece full width of opening jamb angles to terminate sill end.
- C. Insect Screen Frame: Rolled aluminum frame of rectangular sections; fit with adjustable hardware; nominal size similar to operable glazed unit.
- D. Operable Sash Weatherstripping: Resilient plastic; permanently resilient, profiled to achieve effective weather seal.
- E. Glass and Glazing Materials: 1" insulated glass, clear with low-e coating.
- F. Sealant and Backing Materials: As specified in Section 07900.

### 2.04 MATERIALS

- A. Extruded Aluminum: ASTM B 221 (ASTM B 221M), 6063 alloy, T6 temper.
- B. Concealed Steel Items: Profiled to suit mullion sections; galvanized in accordance with ASTM A 123/A 123M to 2.0 oz/sq ft.

### 2.05 HARDWARE

- A. Sash lock: Lever handle with cam lock.
- B. Operator: Geared rotary handle fitted to projecting sash arms with limit stops.

## LINCOLNTON EQUIPMENT SHOP

- C. Projecting Sash Arms: Zinc plated steel, friction pivot joints with nylon bearings, removable pivot clips for cleaning.
- D. Limit Stops: Resilient rubber.

### 2.06 FABRICATION

- A. Fabricate components with smallest possible clearances and shim spacing around perimeter of assembly that will enable window 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.
- D. Arrange fasteners and attachments to ensure concealment from view.
- E. Prepare components with internal reinforcement for operating hardware.
- F. Provide internal drainage of glazing spaces to exterior through weep holes.
- G. Assemble insect screen frames with mitered and reinforced corners. Secure wire mesh tautly in frame. Fit frame with four, spring loaded steel pin retainers.
- H. Double weatherstrip operable units.
- I. Factory glaze window units.

### 2.07 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.
- B. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

### 3.02 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sill and sill end angles.
- E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.
- G. Install operating hardware not pre-installed by manufacturer.
- H. Install glass and infill panels in accordance with requirements specified in Section 08800.
- I. Install perimeter sealant in accordance with requirements specified in Section 07900.

### 3.03 ERECTION TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

### 3.04 ADJUSTING AND CLEANING

- A. Adjust hardware for smooth operation and secure weather-tight closure.
- B. Remove protective material from factory finished aluminum surfaces.
- C. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.
- D. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

## END OF SECTION

## SECTION 08710 - DOOR HARDWARE

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Hardware for hollow steel doors.
- B. Thresholds.
- C. Weatherstripping, seals and door gaskets.

#### 1.02 REFERENCES

- A. NC State Building Code, ANSI A117.1, Accessibility.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; Builders Hardware Manufacturers Association; 1997 (ANSI/BHMA A156.1).
- C. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; Door and Hardware Institute; 1990.
- D. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Wood Flush Doors; Door and Hardware Institute; 1993.

#### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
  - 1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts,.

#### 1.04 DELIVERY, STORAGE, AND PROTECTION

- A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

#### 1.05 COORDINATION

- A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
- B. Furnish templates for door and frame preparation.
- C. Coordinate NC Department of Transportation's keying requirements during the course of the Work.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Hinges: Soss
  - 1. Hager Companies.
  - 2. Stanley Hardware.
- B. Lock and Latch Sets: Corbin / Russwin
  - 1. Schlage Lock Co.
  - 2. Yale Security, Inc.
- C. Push/Pulls: Ives
  - 1. Hiawatha, Inc.
  - 2. Triangle Brass Manufacturing Co., Inc.
- D. Exit Devices: Corbin / Russwin
  - 1. DORMA Door Controls, Inc.
  - 2. Von Duprin.
- E. Closers: Corbin / Russwin
  - 1. DORMA Door Controls, Inc.
  - 2. LCN Closers.

#### 2.02 GENERAL REQUIREMENTS FOR DOOR HARDWARE PRODUCTS

- A. Provide products that comply with the following:
  - 1. Applicable provisions of Federal, State, and local codes.
  - 2. NC State Building Code, Volume 1C; Accessibility Code.

# LINCOLNTON EQUIPMENT SHOP

- B. Finishes: Identified in schedule at end of section.

## 2.03 KEYING

- A. Door Locks: Grand master keyed.
  - 1. Key to existing keying system.
- B. Supply keys in the following quantities:
  - 1. 6 master keys.
  - 2. 3 grand master keys.
  - 3. 2 change keys for each lock.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

### 3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Mounting heights for hardware from finished floor to center line of hardware item: As listed in Schedule, unless otherwise noted:
  - 1. For steel doors and frames: Comply with DHI "Recommended Locations for Architectural Hardware for Steel Doors and Frames."
  - 2. For wood doors: Comply with DHI "Recommended Locations for Architectural Hardware for Wood Flush Doors."

### 3.03 ADJUSTING

- A. Adjust work under provisions of Section 01700.
- B. Adjust hardware for smooth operation.

## END OF SECTION

## SECTION 08800 - GLAZING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Glass (see Alternate 1-Clerestory).
- B. Glazing compounds and accessories.

#### 1.02 RELATED SECTIONS

- A. Section 06200 - Finish Carpentry: Sliding window pass-through, K&V components with requirement for glass.
- B. Section 08110 - Steel Doors and Frames: Glazed doors and borrowed lites.

#### 1.03 REFERENCES

- A. ASTM C 864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 1998.
- B. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 1998.
- C. ASTM E 773 - Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units; 1997.
- D. ASTM E 774 - Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units; 1997.
- E. ASTM E 1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 1997.
- F. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 1997.
- G. GANA (SM) - FGMA Sealant Manual; Glass Association of North America; 1990.

#### 1.04 PERFORMANCE REQUIREMENTS

- A. Select type and thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with NC Building code.
  - 1. Use the procedure specified in ASTM E 1300 to determine glass type and thickness.
  - 2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
  - 3. Thicknesses listed are minimum.

#### 1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.

#### 1.06 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Provide a five (5) year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.
- C. Provide a five (5) year warranty to include coverage for delamination of laminated glass and replacement of same.

### PART 2 PRODUCTS

#### 2.01 FLAT GLASS MATERIALS

- A. Manufacturers:
  - 1. AFG Industries, Inc.
  - 2. Guardian Industries Corp.
  - 3. Pilkington Libbey-Owens-Ford.
  - 4. PPG Industries, Inc.
  - 5. Visteon Glass Systems.
  - 6. Substitutions: Refer to Section 01600 - Product Requirements.
- B. Clear Float Glass (Type Pass-Through Sliding at Parts Room): Clear, annealed.
- C. Safety Glass (Type Exterior & Interior Doors & Sidelights): Clear; fully tempered with horizontal tempering.



## 2.02 SEALED INSULATING GLASS MATERIALS

- A. Manufacturers:
  - 1. Any of the manufacturers listed under Flat Glass Materials.
- B. Insulated Glass Units (Type Exterior Doors & Transoms): Double pane with silicone sealant edge seal.
  - 1. Outer pane of 1/4" clear glass, inner pane of 1/4" clear laminated glass.
  - 2. Place low E coating on No.2 surface within the unit.
  - 3. Comply with ASTM E 774 and E 773, Class CBA.
  - 4. Purge interpane space with dry hermetic air.
  - 5. Total unit thickness of 1 inch minimum.
- C. Edge Seal Construction: Aluminum, bent and soldered corners.
- D. Option for Clerestory: In lieu of insulated glass units use 25mm Lexan Thermoclear, clear color, to be glazed into the storefront type clerestory framing (see Alternate 1-Clerestory).

## 2.03 GLAZING COMPOUNDS

- A. Manufacturers:
  - 1. Dow Corning Corp.
  - 2. GE Silicones.
  - 3. Pecora Corp.
  - 4. Substitutions: Refer to Section 01600 - Product Requirements.
- B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C 920, Type S, Grade NS, Class 25, Uses M, A, and G; cured Shore A hardness of 15 to 25; color as selected.

## 2.04 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C 864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness, ASTM C 864 Option I. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

# PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.

## 3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Install sealant in accordance with manufacturer's instructions.

## 3.03 INSTALLATION - EXTERIOR WET METHOD (SEALANT AND SEALANT)

- A. Place setting blocks at 1/4 points and install glazing pane or unit.
- B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.
- C. Fill gaps between glazing and stops with silicone type sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.
- D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

## 3.04 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Clean glass and adjacent surfaces.

# END OF SECTION

## DIVISION 9 – FINISHES

### SECTION 09260 - GYPSUM BOARD ASSEMBLIES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Metal stud wall framing.
- B. Metal wall furring.
- C. Gypsum wallboard.
- D. Joint treatment and accessories.

##### 1.02 RELATED SECTIONS

- A. Section 07212 - Board and Batt Insulation.

##### 1.03 REFERENCES

- A. ASTM C 36 - Standard Specification for Gypsum Wallboard; 1997.
- B. ASTM C 475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 1994.
- C. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 1997.
- D. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board; 1998.
- E. ASTM C 1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases; 1998.
- F. GA-201 - Using Gypsum Board for Walls & Ceilings; Gypsum Association; 1990.
- G. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 1996.

##### 1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on metal framing.

#### PART 2 PRODUCTS

##### 2.01 MANUFACTURERS

- A. Gypsum Board:
  - 1. G-P Gypsum Corp.
  - 2. National Gypsum Co.
  - 3. United States Gypsum Co.
  - 4. Substitutions: See Section 01600 - Product Requirements.

##### 2.02 METAL FRAMING MATERIALS

- A. Non-Loadbearing Framing System Components: ASTM C 645; galvanized sheet steel, 3-5/8" studs x 25 gage to comply with ASTM C 754 at spacing indicated; maximum deflection L/240 at 5 psf.
  - 1. Studs: C shaped with knurled faces.
  - 2. Runners: U shaped, sized to match studs.
  - 3. Ceiling Channels: C shaped.
  - 4. Wall Furring: Hat-shaped sections, minimum depth of 1-1/2 inch.
- B. Ceiling Hangers: ASTM C 754.

##### 2.03 GYPSUM BOARD MATERIALS

- A. Standard Gypsum Wallboard: ASTM C 36; sizes to minimize joints in place; ends square cut.
  - 1. Thickness: 5/8 inch.
  - 2. Edges: Tapered.
- B. Moisture-Resistant Gypsum Backing Board: ASTM C 630.
  - 1. Standard type, except as otherwise indicated.
  - 2. Edges: Tapered, for taped joint treatment.
  - 3. Thickness: 5/8 inch, except as otherwise shown.

# LINCOLNTON EQUIPMENT SHOP

## 2.04 ACCESSORIES

- A. Corner Beads: Galvanized steel.
- B. Trim: ASTM C 840; Bead type as detailed.
- C. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
  - 1. Ready-mixed vinyl-based joint compound.
- D. Screws: ASTM C 1002; self-drilling type; cadmium-plated for exterior locations.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

### 3.02 FRAMING INSTALLATION

- A. Metal Framing: Comply with ASTM C 754 and manufacturer's instructions.
- B. Studs: Space studs at 24 inches on center.
  - 1. Extend stud framing to roof purlin framing only. Fit top channel runner within a deep leg channel track for a slip joint connection. Gypsum board to be held down ½" from the roof insulation system.
- C. Standard Wall Furring at Office & Break Rooms: Install at masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.

### 3.03 GYPSUM BOARD INSTALLATION

- A. Comply with ASTM C 840. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Installation on Metal Framing: Use screws for attachment of all gypsum board.
- D. Install moisture-resistant backing board at the Wash Bay and Tire Change Bay upper walls.

### 3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Corner Beads: Install at external corners, using longest practical lengths.
- B. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

### 3.05 JOINT TREATMENT

- A. Finish all gypsum board in accordance with ASTM C 840 Level 4.

### 3.06 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

## END OF SECTION

## SECTION 09300 - TILE

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Ceramic and paver tile for floor and wall applications.

#### 1.02 REFERENCES

- A. ANSI A108 Series/A118 Series/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 1992.
  - 1. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 1992.
  - 2. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar; 1992.
  - 3. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex Portland Cement Mortar; 1992.
  - 4. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1992.
  - 5. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1992.
  - 6. ANSI A118.1 - American National Standard Specifications for Dry-Set Portland Cement Mortar; 1992.
  - 7. ANSI A118.4 - American National Standard Specifications for Latex-Portland Cement Mortar; 1992.
  - 8. ANSI A118.6 - American National Standard Specifications for Ceramic Tile Grouts; 1992.
  - 9. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 1988.
- B. TCA (HB) - Handbook for Ceramic Tile Installation; Tile Council of America, Inc.; 2004.

#### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide instructions for using grouts and adhesives.
- C. Samples: Mount tile and apply grout on one plywood panel, 12x12 inch in size illustrating pattern, color variations, and grout joint size variations.
- D. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

#### 1.04 QUALITY ASSURANCE

- A. Maintain one copy of TCA Handbook and ANSI A108 Series/A118 Series on site.

#### 1.05 PRE-INSTALLATION MEETING

- A. Convene one week before starting work of this section.

#### 1.06 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

#### 1.07 EXTRA MATERIALS

- A. Provide 2 percent of each size, color, and surface finish of tile specified.

### PART 2 PRODUCTS

#### 2.01 TILE

- A. Manufacturers: All products by the same manufacturer.
  - 1. Dal-Tile Corp.
  - 2. Substitutions: Equal to American Olean Tile Co., or Summitville Tiles, Inc. See Section 01600 - Product Requirements.
- B. Glazed Wall Tile: ANSI A137.1, and as follows:
  - 1. Semi-gloss Wall Tile by DalTile.

## LINCOLNTON EQUIPMENT SHOP

2. Moisture Absorption: 3.0 to 7.0 percent.
  3. Size and Shape: 4-1/4 inch square.
  4. Edges: Cushioned.
  5. Surface Finish: High gloss.
  6. Colors: # X-114, Desert Gray and accent band and base, #D-192, Aegean.
  7. Pattern: See drawings.
  8. Trim Units: Matching bead, bullnose, and cove base shapes in sizes indicated.
- C. Glazed Paver Tile: ANSI A137.1, and as follows:
1. "Keystone"; Dal-Tile Corp.
  2. Moisture Absorption: 0.5 to 3.0 percent.
  3. Size and Shape: 2" x 2" x 1/4".
  4. Thickness: 5/16"
  5. Face: Plain.
  6. Edges: Cushioned.
  7. Surface Finish: Slip-resistant un-glazed on all floor tile.
  8. Colors: Color: DK-147, Buffstone Range.
  9. Trim Units: Matching bullnose and cove base shapes in sizes indicated.

### 2.02 MORTAR MATERIALS

- A. Manufacturers:
1. W.R. Bonsal Co.
  2. Bostik.
  3. Custom Building Products.
  4. Substitutions: See Section 01600 - Product Requirements.
- B. Mortar Bed Materials: Portland cement, sand, latex additive and water.
- C. Mortar Bond Coat Materials:
1. Dry-Set Portland Cement type: ANSI A118.1.
  2. Latex-Portland Cement type: ANSI A118.4.

### 2.03 GROUT MATERIALS

- A. Manufacturers:
1. **TEC\***, Custom Bldg. Products, or SGM.
  2. Substitutions: See Section 01600 - Product Requirements.
- B. Standard Grout: Latex-Portland cement type as specified in ANSI A118.6.
1. Color: TEC #949, Silveraldo.

### 2.04 ACCESSORY MATERIALS

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified in Section 03300 and are ready to receive tile.

### 3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

### 3.03 INSTALLATION - GENERAL

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.10, manufacturer's instructions, and TCA Handbook recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor and base joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- E. Form internal angles square and external angles bullnosed.

## LINCOLNTON EQUIPMENT SHOP

- F. Sound tile after setting. Replace hollow sounding units.
- G. Keep expansion joints free of adhesive or grout. Apply sealant to joints.
- H. Allow tile to set for a minimum of 48 hours prior to grouting.
- I. Grout tile joints. Use standard grout unless otherwise indicated.
- J. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

### 3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-portland cement bond coat, with standard grout, unless otherwise indicated.

### 3.05 INSTALLATION - WALL TILE

- A. Over interior concrete and masonry install in accordance with TCA Handbook Method W202, thin-set with dry-set or latex-portland cement bond coat.

### 3.06 CLEANING

- A. Clean tile and grout surfaces.

### 3.07 PROTECTION OF FINISHED WORK

- A. Do not permit traffic over finished floor surface for 4 days after installation.

## END OF SECTION

## SECTION 09511 - SUSPENDED ACOUSTICAL CEILINGS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

#### 1.02 REFERENCES

- A. ASTM C 635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 1997.
- B. ASTM C 636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 1996.
- C. ASTM E 580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint; 1996.
- D. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products; 1996.

#### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.

#### 1.04 ENVIRONMENTAL REQUIREMENTS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

#### 1.05 PROJECT CONDITIONS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Install acoustical units after interior wet work is dry.

#### 1.06 EXTRA MATERIALS

- A. See Section 01600 - Product Requirements, for additional provisions.
- B. Provide 5 percent of total acoustical unit area of each type of acoustical unit for NC Department of Transportation's use in maintenance of project.

### PART 2 PRODUCTS

#### 2.01 ACOUSTICAL UNITS

- A. Manufacturers:
  - 1. **Armstrong World Industries, Inc\***.
  - 2. Celotex Corp.
  - 3. USG Interiors, Inc.
  - 4. Substitutions: See Section 01600 - Product Requirements.
- B. Acoustical Units - General: ASTM E 1264, Class A.
- C. Acoustical Panels: ASTM E 1264 Type III, Painted mineral fiber, conforming to the following:
  - 1. Size: 24 x 24 inches.
  - 2. Thickness: 5/8 inches.
  - 3. Composition: Wet felted.
  - 4. Light Reflectance: 80 percent.
  - 5. NRC Range: .50 to .55.
  - 6. Edge: Square.
  - 7. Surface Color: White.
  - 8. Surface Pattern: Non-directional fissured.
  - 9. Product: **"Fissured", #756 by Armstrong.**
  - 10. Suspension System: Exposed grid.

## 2.02 SUSPENSION SYSTEM(S)

- A. Manufacturers:
  - 1. Same as for acoustical units.
  - 2. Substitutions: See Section 01600 - Product Requirements.
- B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled, with painted finish; Intermediate-duty.
  - 1. Profile: Tee; 15/16 inch wide face.
  - 2. Construction: Double web.
  - 3. Finish: White.

## 2.03 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
  - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

## PART 3 EXECUTION

### 3.01 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.
- J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
  - 1. Use longest practical lengths.
  - 2. Overlap and rivet corners.

### 3.02 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
  - 1. Make field cut edges of same profile as factory edges.

### 3.03 ERECTION TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

## END OF SECTION



## SECTION 09650 - RESILIENT FLOORING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

#### 1.02 REFERENCES

- A. ASTM F 1066 - Standard Specification for Vinyl Composition Floor Tile; 1995a.
- B. ASTM F 1861 - Standard Specification for Resilient Wall Base; 1998.

#### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Verification Samples: Submit two samples, 2 inch in size illustrating color and pattern for each resilient flooring product specified.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

#### 1.04 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

#### 1.05 EXTRA MATERIALS

- A. Provide 10 sq ft of flooring, 16 lineal feet of base, and 5 percent of installed stair materials of each type and color specified.

### PART 2 PRODUCTS

#### 2.01 MATERIALS - TILE FLOORING

- A. Vinyl Composition Tile: ASTM F 1066:
  - 1. Thickness: 0.125 inch.
  - 2. Pattern: Marbleized.
  - 3. Manufacturers: Comparable products of Azrock or Kentile will be considered for substitution.
    - a. **Armstrong World Industries, Inc.; Product "Imperial Texture", Standard Excelon\***.
    - b. Color: No. **51906, Teal**.
    - c. Substitutions: See Section 01600 - Product Requirements.

#### 2.02 MATERIALS - BASE

- A. Resilient Base: ASTM F 1861, Type TS rubber, vulcanized thermoset; top set Style A, Straight, and as follows:
  - 1. Height: 4 inch x 4' lengths.
  - 2. Thickness: 0.125 inch thick.
  - 3. Finish: Matte.
  - 4. Color: **Roppe-P168, Deep Water\***.
  - 5. Manufacturers:
    - a. Roppe Corp.; Product Vulcanized SBR Rubber.
    - b. Substitutions: See Section 01600 - Product Requirements; Johnsonite or Armstrong matching color.

#### 2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

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- C. Moldings and Edge Strips: Base; P168, Deep Water manufactured by Roppe.
- D. Sealer and Wax: Types recommended by flooring manufacturer.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified in Section 03300 and are ready to receive resilient flooring.
- B. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of adhesive materials to sub-floor surfaces.

### 3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- B. Prohibit traffic until filler is cured.

### 3.03 INSTALLATION - TILE FLOORING

- A. Install in accordance with manufacturer's instructions.
- B. Mix tile from container to ensure shade variations are consistent when tile is placed.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Set flooring in place, press with heavy roller to attain full adhesion.

### 3.04 INSTALLATION - BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.

### 3.05 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean, seal, and wax resilient flooring products in accordance with manufacturer's instructions.

## END OF SECTION

## SECTION 09900 - PAINTS AND COATINGS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, varnishes, and other coatings.
- C. See Schedule - Surfaces to be Finished, at end of Section.

#### 1.02 REFERENCES

- A. ASTM D 16 - Standard Terminology for Paint, Coatings, Materials, and Applications; 1998b.

#### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products.

#### 1.04 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

#### 1.05 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- D. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

#### 1.06 EXTRA MATERIALS

- A. See Section 01600 - Product Requirements, for additional provisions.
- B. Supply 1 gallon of each color; store where directed.
- C. Label each container with color in addition to the manufacturer's label.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Paints: All paints shall be low VOC type equal to;
  - 1. **The Glidden Company\* - Lifemaster.**
- B. Products of the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered in accordance with standard substitution procedures:
  - 1. Devoe & Reynolds Company - Lifemaster.
  - 2. Benjamin Moore & Company - Pristine EcoSpec.
  - 3. Sherwin Williams Company - Pro Green 200 and Harmony.

#### 2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, except field-catalyzed coatings. Prepare pigments:
  - 1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
  - 2. For good flow and brushing properties.
  - 3. Capable of drying or curing free of streaks or sags.

## 2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint ME-OP-2L - Ferrous Metals, Primed, Latex-acrylic, 2 Coat: Bollards (Guard Posts), HM door & frames, & Overhead doors;
  - 1. Touch-up with ICI, Glid-Guard Tank & Structural Primer 5205 Series primer.
  - 2. Semi-gloss: Two coats of latex-acrylic; ICI, Lifemaster Pro HB Acrylic Coating, 54440 Series-door color- # 30GG 22/079-"Bicentennial", and frame color- # 30YY 65/060-"Fossil Grey".
- C. Concrete Masonry Units – Elastomeric Coating;
  - 1. Prime Coat: ICI Prep & Prime Bond-Prep, 3030 Series, 250 sq.ft./gallon
  - 2. ICI Decra-Flex Elastomeric Coating, 2269 Series, 100 sq.ft./gallon; color to match Adams Products #110, Natural Grey (single scored) and #A404, Carolina Clay (split face) color samples

## 2.04 PAINT SYSTEMS - INTERIOR

- A. Paint WI-TR-VS - Wood, Transparent, Varnish, Stain: Oak base and wall cabinets at the Break room.
  - 1. One coat of stain; ICI, WoodPride Semi-Transparent Wood Finishing Stain-color: "Provincial".
  - 2. Satin: Two coats of varnish; ICI WoodPride AquaAcrylic Varnish, waterborne.
- B. Paint CI-OP-2A – Concrete/Masonry, Opaque, Alkyd, 2 Coat: All interior CMU walls and 4' h. wainscot,
  - 1. One coat of block filler.
  - 2. Semi-gloss: Two coats of latex-acrylic; [ICI, LifeMaster 2000 Egg-Shell, 9300 Series-wall & ceiling color- # 30GY 76/017, "N.B.C. White" and wainscot color- # 30GG 22/079-"Bicentennial".
- C. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat: All interior HM doors & frames, steel stairs, handrails, and exposed structural steel columns & beams,
  - 1. Touch-up with above primer.
  - 2. Semi-gloss: Two coats of latex-acrylic; ICI, Lifemaster Pro HB ACrylic Coating, 54440 Series-door frame color- # 30GG 22/079-"Bicentennial".
- D. Paint GI-OP-3LA - Gypsum Board/Plaster, Latex-Acrylic, 3 Coat: Upper interior drywall walls, exposed electrical conduit and piping,
  - 1. One coat of ICI Ultra-Hide PVA Primer-Sealer, 5019 Series.
  - 2. Flat: Two coats of latex dry-fall-out; ICI, LifeMaster 2000 Egg-Shell, 9300 Series-wall & ceiling color- # 30GY 76/017, "N.B.C. White".
- E. Gypsum Wallboard, Latex acrylic: Walls at the Wash Bay & Tire Storage only.
  - 1. Bottom coat: Ultra-Hide 1260 Airless High-Build Flat Interior Primer / Finish; 1.1DFM.
  - 2. Intermediate coat: Same as top coat.
  - 3. Top coat: Devflex PF 4020PF Interior/Exterior Semi-gloss waterborne acrylic (color # 30GY 76/017, "N.B.C. White".

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.

### 3.02 PREPARATION

- A. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- B. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.
- C. Marks: Seal with shellac those which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- F. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
- G. Interior Wood Items to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

### 3.03 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- D. Sand wood surfaces lightly between coats to achieve required finish.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

### 3.04 SCHEDULE - SURFACES TO BE FINISHED

- A. Do Not Paint or Finish the Following Items:
  - 1. Items fully factory-finished unless specifically noted.
  - 2. Fire rating labels, equipment serial number and capacity labels.
- B. Paint the surfaces described below under Schedule - Paint Systems.
- C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
  - 1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
  - 2. Paint shop-primed items occurring in finished areas.
  - 3. Paint interior surfaces of air ducts and convectors and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
  - 4. Paint dampers exposed behind louvers, grilles, and convectors and baseboard cabinets to match face panels.

### 3.05 SCHEDULE - PAINT SYSTEMS

- A. Interior masonry, upper drywall, H.M. doors & frames, cabinetry, and Trim: Finish all surfaces exposed to view.
  - 1. Exterior: CE-OP-3A, flat.
  - 2. Interior: CI-OP-3L, flat.
- B. Gypsum Board: Finish all surfaces exposed to view.
- C. Wood Cabinets: Finish all exposed and semi-exposed surfaces.
  - 1. Inside Surfaces: WI-OP-2A, semi-gloss.
- D. Steel Doors and Frames: Finish all surfaces exposed to view; MI-OP-3A, semi-gloss.

## END OF SECTION

## DIVISION 10 – SPECIALTIES

### SECTION 10170 - PLASTIC TOILET COMPARTMENTS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Solid plastic toilet compartments.
- B. Urinal screens.

##### 1.02 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.

##### 1.03 COORDINATION

- A. Coordinate the work with placement of support framing and anchors in wall.

#### PART 2 PRODUCTS

##### 2.01 MANUFACTURERS

- A. Plastic Toilet Compartments:
  - 1. Ampco Products, Inc
  - 2. Comtec Industries
  - 3. **Scranton/Santana Products Co., Inc\***
  - 4. Substitutions: Section 01600 - Product Requirements.

##### 2.02 COMPONENTS

- A. Toilet Compartments: Solid molded plastic panels, doors, and pilasters, floor-mounted headrail-braced.
  - 1. Color: **Sandcastle**.
- B. Door and Panel Dimensions:
  - 1. Thickness: 1 inch.
  - 2. Door Width: 24 inch.
  - 3. Door Width for Handicapped Use: 36 inch, out-swinging.
  - 4. Height: 58 inch.
  - 5. Thickness of Pilasters: 1-1/4 inch.
- C. Urinal Screens: Wall and floor mounted with continuous panel brackets and anchored to wall blocking.

##### 2.03 ACCESSORIES

- A. Pilaster Shoes: Matching plastic and color of partitions, 3" high, concealed floor fasteners.
- B. Heat Sink: Continuous metal strip at the bottom of all panels, screens, and doors.
- C. Head Rails: Hollow chrome plated steel tube, 1 x 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.
- D. Brackets: Wall mounted with continuous panel brackets of matching plastic, and anchored to wall blocking.
- E. Hardware: Polished chrome plated non-ferrous cast metal:
  - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
  - 2. Sliding door latch with single movement for accessible operating hardware.
  - 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
  - 4. Coat hook with rubber bumper; one per compartment, mounted on door.
  - 5. Provide door pull for outswinging doors.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated on shop drawings.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

### **3.02 INSTALLATION**

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attached panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

## **END OF SECTION**

## SECTION 10441 - SIGNS

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Raised letter plastic signs.
- B. Parking Sign and post.
- C. Project sign.

#### 1.02 REFERENCES

- A. NC State Building Code, ANSI A117.1; Accessibility.

#### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.
- C. Samples: Submit one sample signs, 2x10 inch in size illustrating type, style, letter font, and colors specified; method of attachment.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Plastic Signs:
  - 1. AdHenderson Printing Products, Inc.
  - 2. **Best Manufacturing Co\***.
  - 3. Mohawk Sign Systems, Inc.
  - 4. Substitutions: See Section 01600 - Product Requirements.

#### 2.02 RAISED LETTER SIGNS

- A. Base Material: **Light Teal, # 348** solid color acrylic plastic:
  - 1. Total Thickness: 1/8 inch.
  - 2. Height: 2 inches.
  - 3. Edges: Square
- B. Raised Character Size and Style: Acrylic plastic, character adhered to base material:
  - 1. Comply with applicable provisions of NCSBC, including Braille.
  - 2. Character Color: White.
  - 3. Character Thickness: 1/8 inch.
  - 4. Height: 5/8 inch.
  - 5. Edges: Square.
  - 6. Character Font: Helvetica.
  - 7. Character Case: Upper case only.

#### 2.03 INDIVIDUAL GRAPHICS

- A. Material: White solid color acrylic plastic:
  - 1. Thickness: 1/8 inch.
  - 2. Height: 6 inches.
  - 3. Edges: Square.
- B. Character Style:
  - 1. Character Font: Helvetica.
  - 2. Character Case: Upper case only.

#### 2.04 ACCESSORIES

- A. Mounting Hardware: Chrome screws.
- B. Tape Adhesive: Double sided tape, permanent adhesive.



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## 2.07 INFRA-RED HEATER SIGNAGE:

- A. Stencil Lettering shall be painted on web sides of the steel bridge crane beams and shall read "DO NOT PARK BRIDGE CRANE BELOW HEATERS", with 4" high, white letters at both sides of the columns / infrared heaters.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Position sign 2" from strike side of door frame; center of sign plaque 60" AFF on the wall surface; level. If the strike side wall is not available center on the door or if the door and strike side wall is not available the adjacent wall maybe considered for mounting.

### 3.02 SCHEDULES

- A. Sign plaques shall read as follows:
  - 1. WOMEN\* @ room 107
  - 2. MEN\* @ room 111
  - 3. BREAK-ROOM @ room 110
  - 4. PARTS ROOM @ room 104 (2-required)
  - 5. MECHANICAL @ room 109
  - 6. JANITOR @ rooms 108
  - 7. SUPERVISOR @ room 103 (2-required)
  - 8. TIRE CHANGE @ room 101
  - 9. WASH BAY @ room 102
  - 10. MAXIMUM LOAD 125 PSF @ bottom of stairs
  - 11. TIRE STORAGE  
1,000 CU. FT. LIMIT @ top of the Mezzanine stairs
  - 12. TIRE STORAGE
  - 13. 700 CU. FT. LIMIT @ room 104
  - 14. OIL STORAGE  
1,540 GAL. LIMIT @ top of the Mezzanine stairs
- B. \* Provide the caricature symbol at signs noted above with White figure and border on **Light Teal** background, 8"x8" size, mount to wall.
- C. Handicap Parking Signs shall be furnished, 1-required, including \$250 Penalty sign, type R7-8d (Van Accessible) and shall be painted metal with green copy mounted 84" to the top in accordance with GS20-30.6.
- D. Project sign, see following page.

# LINCOLNTON EQUIPMENT SHOP

NC DEPARTMENT OF TRANSPORTATION

2" HIGH COPY

ARCHITECT / ENGINEER:

**FACILITIES DESIGN**

1-1/2" HIGH COPY

**General Services Division, NCDOT**

2" HIGH COPY

2" HIGH COPY

CONTRACTORS:

**GENERAL CONTRACTOR**

1 1/2" HIGH COPY

**PLUMBING Subcontractor**

2" HIGH COPY

**HVAC Subcontractor**

**ELECTRICAL Subcontractor**

4' x 6' x 3/4" exterior plywood, painted light grey color  
#30GY 76/017, "N.B.C. White" (Glidden) background W/  
2 - 4" x 4" treated wood posts (3' below grade), bottom of  
sign panel 3' above grade, all copy Helvetica Medium Style,  
color # 30GG 22/079-"Bicentennial".

**END OF SECTION**

## SECTION 10505 - METAL LOCKERS

### PART 1 – GENERAL

#### 1.01 SUMMARY

- A. Section Includes:
  - 1. Standard duty metal lockers.
- B. Work Not Included:
  - 1. Padlocks: Provided by the owner.

#### 1.02 DEFINITIONS

- A. Standard Duty: This term is used to designate a particular type of locker specified in this section, regardless of individual manufacturer designations.

#### 1.03 SUBMITTALS

- A. Product Data: Manufacturer's data and installation instructions.
- B. Shop Drawings: Show layouts, dimensions, trim, fillers, and accessories.
  - 1. Indicate installation and anchoring methods.
  - 2. Show verified field measurements.
  - 3. Show locker numbering scheme.
- B. Samples for Color Verification: Actual finish samples on similar sheet metal.

#### 1.04 PROJECT CONDITIONS

- A. Fit lockers neatly to actual construction; take field measurements before fabrication, unless taking of such measurements will delay the work. In that case, provide trim and filler panels as required.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver lockers until spaces to receive lockers are clean and dry.
- B. Protect lockers from damage.

### PART 2 – PRODUCTS

#### 2.01 LOCKER CONFIGURATIONS AND COMPONENTS

- A. Lockers:
  - 1. Location: Women 107, and Men 111.
  - 2. Standard duty.
  - 3. Single-tier.
  - 4. Height: 72 inches.
  - 5. Width: 12 inches.
  - 6. Depth: 18 inches.
  - 7. Doors: Solid with mini-louvers.
  - 8. Sides and vertical dividers: Solid.
  - 9. Shelves: Solid.
  - 10. Top: Sloped.
  - 11. Door handles.
  - 12. Shelf.
  - 13. Ceiling hook.
  - 14. Two wall hooks.

#### 2.02 STANDARD DUTY LOCKERS

- A. Provide all standard duty lockers and accessories by one manufacturer.
  - 1. Manufacturers: Products of the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:
    - a. Lyon Metal Products, Inc.

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- c. **Penco Products\***.
- d. Republic Storage Systems Company, Inc.
- B. Components:
  - 1. Frame: 16 gage steel channels or 13 gage steel angles, minimum.
  - 2. Tops: 24 gage steel sheet, minimum.
  - 3. Bottoms: 24 gage steel sheet, minimum.
  - 4. Horizontal dividers: 24 gage steel sheet, minimum.
  - 5. Sides and vertical dividers: 24 gage steel sheet, minimum.
  - 6. Backs: 24 gage steel sheet, minimum.
  - 7. Solid doors: 16 gage steel sheet, minimum.
  - 8. Louvers: Manufacturer's standard style, size, and quantity.
  - 9. Door handles: Standard type.
  - 10. Latching mechanism: Concealed in door, designed so that door can be closed while locked, with spring-loaded latches engaging beveled strikes on frame.
    - a. Doors over 36 inches high: Three-point latching, minimum.
- C. Miscellaneous Components and Trim: 18 gage steel sheet, minimum.
- D. Fabrication: Weld all joints between frame members.
  - 1. Weld hinges to frame and fasten to door with at least 2 fasteners which are either tamperproof or concealed when door is closed.

### 2.03 MATERIALS

- A. Steel Sheet: Cold-rolled, leveled mild steel.
- B. Fasteners: Zinc-, cadmium-, or nickel-plated steel or stainless steel.
  - 1. Exposed bolt heads: Tamperproof type.
  - 2. For fastening moving components: Use lock washers or self-locking nuts.
- C. Hinges: 5-knuckle, nonremovable-pin hinges, of loop style with 2 full thicknesses in each leaf; minimum 2 inches high.
  - 1. Minimum of 2 hinges per door.
  - 2. Doors over 42 inches high: Three hinges.
- D. Standard Door Handles: Die-cast zinc alloy or chrome-plated steel latch lifter and padlock hasp, designed so that door can be closed while locked; pry-resistant.
- E. Interior Fittings: Cadmium- or zinc-plated steel or cast aluminum, except shelves.
- F. Number Plates: Aluminum, zinc alloy, or stainless steel; raised or recessed numerals at least 3/8 inch high.
  - 1. Number lockers as directed by the architect.
  - 2. Fasten to doors, centered near the top, using 2 fasteners.

### 2.04 FABRICATION - ALL LOCKERS

- A. Factory-fabricate and fully assemble lockers; do not knock down for shipping.
- B. Make lockers square with rigid joints, without dents or warped surfaces.
  - 1. Exposed metal edges: Smooth off sharp edges and corners.
  - 2. Exposed welds: Grind flush.
  - 3. Door and frame fronts: No exposed bolts or rivet heads.
  - 4. Where exposed holes for built-in locks are not used, cover holes neatly using permanent materials.
- C. Doors: Fabricate with flanged edges, reinforced if required for stiffness, and designed to open and close without springing.
  - 1. Fabricate sheet steel doors of one piece.
  - 2. Provide extra stiffeners for doors more than 15 inches wide.
- D. Miscellaneous Components: Provide all parts, filler panels, closures, clips, and fasteners required for a complete installation.
- E. Finishing: Pretreat and finish all surfaces, both exposed and concealed, except stainless steel, chrome, and aluminum.
  - 1. Factory-finish all accessory components to match.
  - 2. Pretreatment: Remove scale, rust, and contaminants; chemically degrease and phosphatize.
  - 3. Finish: Manufacturer's standard baked-on enamel.
  - 4. Custom Color: **No. 952, "Turquoise Teal" by Penco.**

## **PART 3 – EXECUTION**

### **3.01 PREPARATION**

- A. Clean debris from under and behind lockers before installation.

### **3.02 INSTALLATION**

- A. Install lockers plumb and level.
- B. Anchor lockers securely to substrates in manner recommended by manufacturer.
  - 1. Use reinforcing plates and spacers as required to prevent metal distortion.
  - 2. Provide anchors at not more than 48 inches on center.
  - 3. Conceal fasteners wherever possible.
- C. Install accessory components with flush, tight joints using concealed fasteners.

### **3.03 ADJUSTING**

- A. Adjust doors and latches for smooth operation.

### **3.04 CLEANING**

- A. Clean and touch up finishes; if finish cannot be restored to original appearance, replace locker.
- B. Use only cleaning and touch-up materials recommended by manufacturer.

**END OF SECTION 10505**

## SECTION 10523 - FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Fire extinguishers (3).
- B. Fire extinguisher cabinets (2) and 1-bracket.
- C. Accessories.

#### 1.02 REFERENCES

- A. NFPA 10 - Standard for Portable Fire Extinguishers; National Fire Protection Association; 1998.
- B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

#### 1.03 PERFORMANCE REQUIREMENTS

- A. Conform to NFPA 10.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

#### 1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features and color and finish.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Fire Extinguishers, Cabinets and Accessories:
  - 1. JL Industries, Inc.
  - 2. Larsen's Manufacturing Co.
  - 3. Potter-Roemer.
  - 4. Substitutions: See Section 01600 - Product Requirements.

#### 2.02 FIRE EXTINGUISHERS

- A. Dry Chemical Type: Cast steel tank, with pressure gage.
  - 1. Class 4A:60B:C.
  - 2. Size 10.
  - 3. Finish: Baked enamel, red color.

#### 2.03 FIRE EXTINGUISHER CABINETS

- A. Metal: Formed aluminum; 2-1/2 inch thick.
- B. Cabinet Configuration: Semi-recessed type.
  - 1. Sized to accommodate accessories.
  - 2. Exterior nominal dimensions of 9 inch wide x 27 inch high x 4 inch deep into wall.
  - 3. Trim: Returned to wall surface, with 2-1/2 inch projection, 2-1/2 inch wide face.
- C. Door: 0.036 inch thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with two butt hinge. Provide nylon catch.
- D. Door Glazing: Plastic, clear, 1/8 inch thick polycarbonate. Set in resilient channel gasket glazing.
- E. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.
- F. Finish of Cabinet Interior: White enamel.

#### 2.04 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Cabinet Signage: Vertical letters on glass door.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify rough openings for cabinet are correctly sized and located.

### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Provide 9-fire extinguishers and cabinets and relocate existing bracket mounted fire extinguishers to the 4-outside Mechanical and electrical rooms.
- B. Install cabinets plumb and level in wall openings, 40 inches from finished floor to inside bottom of cabinet.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

## END OF SECTION

## SECTION 10675 - METAL STORAGE SHELVING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Extent, location and details of metal storage shelving are indicated on drawings, see Parts Room 104.

#### 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and installation instructions for each type of metal storage systems and installation accessory required. Include methods of installation for each type of substrate.
  - 1. Submit written data on physical characteristics, durability, resistance to fading and flame resistance characteristics.
- B. Shop Drawings: Submit shop drawings showing location, ranges and extent of metal shelving systems. Show installation details at any special or non-standard conditions.
- C. Samples for Initial Selection Purposes: Submit manufacturer's standard size samples of colors and finishes.

#### 1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm (material producer) with not less than 3 years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.
- B. Installer qualifications: Firm specializing in metal storage shelving installation with not less than 2 years of experience in installation of metal storage shelving similar to that required for this project.
- C. Single Source Responsibility: Provide material produced by a single manufacturer for each shelving unit type.

#### 1.4 DELIVERY, STORAGE AND HEADLING

- A. Comply with instructions and recommendations of manufacturer for special delivery, storage, and handling requirements.
- B. Sequence metal storage shelving installation with other work to minimize possibility of damage and soiling during remainder of construction period.
- C. Replacement Materials: After completion of work, deliver not less than 2 of each type, color, and pattern of metal storage shelving, exclusive of material required to properly complete installation. Furnish 2% of accessory components as scheduled. Furnish replacement materials from same production run as materials installed. Package replacement materials with protective covering, identified with appropriate labels.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated into the work include:
- B. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
  - 1. Acme Visible Records
  - 2. E-Z Shelving Inc.
  - 3. Lundia Lyon Metal Products, Inc.
  - 4. **Penco Products, Inc.\***
  - 5. Republic Storage Systems Company, Inc.

#### 2.2 MATERIALS

- A. General: Minimum 0.04 inch (1.0 mm) cold-rolled steel sheet metal, washed to receive powder coated baked enamel finish, higher gauge where indicated to provide appropriate loading capacity.



## LINCOLN TON EQUIPMENT SHOP

- B. Open Shelving: Provide heavy duty open shelving units as indicated, frame slotted to receive shelves, clipped together with shelves. Units laterally and end cross braced as required for stability with intended load. Shelves adjustable 1-1/2 inches on center. 36 & 48 inches wide, 84 inches high unless otherwise indicated on drawings or in specifications (Provide 41 units).
  - 1. Shelf Depth: Provide shelving of standard depth as follows:
    - a. Standard Shelf Depth: 18 inches (305 mm).
  - 2. Unit Configuration: Provide shelf units in configuration as follows:
    - a. Standard Upright Assembly: Unit equipped with two uprights, shelves, top and back to stand independently.
    - b. Starter/Adder Assembly: First unit of each bank equipped with two uprights, shelves, top and back to stand independently, each succeeding unit equipped with one upright, shelves, top and open back, allowing attachment to preceding unit. Provide one upright assembly at the closed end of each bank.
  - 3. Shelves: Provide units with number of shelves as indicated:
    - a. Regular Shelves: 6 shelves.
- C. Uprights: Punched 1-1/2 inches (38 mm) on center with pairs of parallel slots 11/16 inch (17 mm) long, one slot keyhole shaped for bolting cross braces and accessories to uprights.
  - 1. Closed Uprights: Two minimum 0.06 inch (1.5 mm) formed steel T sections, 1-1/2 x 2-1/8 x 1/8 inches (38 x 54 x 3 mm), with minimum 0.02 inch (0.6 mm) side sheet spot-welded 6 inches (150 mm) on center to the 1/2 inch (13 mm) extension of T section.
- D. Shelf Clips: Minimum 0.10 inch (2.5 mm) hot rolled one-piece construction steel. Provide four clips with each shelf.
- E. Shelves: Minimum 0.05 inch (1.3 mm), flanged front, rear and sides, punched to accommodate labelholders and accessories. Lap and spot weld corners, punch 3 inches (75 mm) on center to receive dividers.
  - 1. Unreinforced shelves, without reinforcing flange.

### 2.3 FINISHES

- A. Provide units in finishes and colors of the manufacturer's custom or accent color shall match **No. 952, "Turquoise Teal" by Penco.\***

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Inspect the Storage Room area and conditions in which metal storage shelving will be installed. Verify locations of power feeds, positioning of exits and aisle ways and overall dimensions of space, including height and HVAC venting.

### 3.2 PREPARATION

- A. Prior to installation of shelving system, vacuum floor surface to remove dust, debris and loose particles. Resilient flooring wet mopped and dried or finish buffed. Verify that components, including size and finish are those specified before installing.

### 3.3 INSTALLATION

- A. Install shelving system and accessories after finishing operations, including painting have been completed. Install system to comply with final layout drawings, in strict compliance with manufacturers printed instructions. Position units level, plumb; at proper location relative to adjoining units and related work. Adjust accessories to provide visually acceptable installation. Attach top or shelving units to adjacent walls with 3-masonry screws per 48" wide unit. Attach base of floor standing units with angle bracket and masonry/concrete screws after the Owner has verified the final location of shelving units.

### 3.4 FIELD QUALITY CONTROL

- A. Remove and replace shelving components which are chipped, scratched, or otherwise damaged and which do not match adjoining work. Provide new matching units, installed as specified and in manner to eliminate evidence of replacement.

## **LINCOLNTON EQUIPMENT SHOP**

### **3.5 ADJUST**

- A. Adjust components and accessories to provide visually acceptable installation.

### **3.6 CLEANING**

- A. Immediately upon completion of installation, clean components and surfaces following manufacturer's recommended procedures.
- B. Remove surplus materials, rubbish and debris resulting from installation upon completion of work and leave areas of installation in neat, clean condition.

### **3.7 DEMONSTRATION**

- A. Upon completion of installation of system, inspect and determine capability and compliance with requirements. Repair or replace units which are not functional. All shelves and/or accessories shall be smoothly in place with no visual buckling or non-alignment of parts evident.

### **3.8 PROTECTION**

- A. Protect system against damage during remainder of construction period. Advise owner of additional protection needed to ensure that system will be without damage or deterioration at time of Substantial Completion.

**END OF SECTION 10675**

## SECTION 10800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Accessories for toilet rooms, shower, and utility rooms.
- B. Grab bars.

#### 1.02 REFERENCES

- A. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 1998.
- B. ASTM C 1036 - Standard Specification for Flat Glass; 1991 (Reapproved 1997).
- C. FS DD-M-411 - Mirrors, Glass; Federal Specifications and Standards; Revision C, 1990.

#### 1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

#### 1.04 COORDINATION

- A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Products listed are made by **American Specialties, Inc\***, Bobrick Washroom Equipment, Inc., or Bradley Corp.

#### 2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
  - 1. Grind welded joints smooth.
  - 2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- B. Keys: Provide 2 keys for each accessory to NC Department of Transportation.
- C. Stainless Steel Sheet: ASTM A 666, Type 304.
- D. Mirror Glass: Float glass, Type I, Class 1, Quality q2 (ASTM C 1036), with silvering, copper coating, and suitable protective organic coating to copper backing in accordance with FS DD-M-411.
- E. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof, security type.

#### 2.03 FINISHES

- A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.

#### 2.04 TOILET ROOM ACCESSORIES

- A. Double Roll Toilet Tissue Dispenser: Heavy-duty cast aluminum, satin matte silver-gray finish. No waste rocking action spindles of cyclac ABS thermoplastic. Holds 2 rolls up to 6" (150 mm) diameter (2000 sheets).
  - 1. Product: 0264-1 manufactured by American Specialties.
- B. Recessed Multipurpose Unit: Mirror/Towel Dispenser (600 C-fold) / Soap Dispenser (101 fl. oz.), recessed flush with wall, stainless steel; seamless wall flanges, continuous piano hinges.
  - 1. Product: 0430 manufactured by American Specialties.
- C. Mirrors: Stainless steel framed, 6 mm thick float glass mirror.
  - 1. Frame: 0.05 inch channel shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 finish. Size: 20"X60".
  - 2. Product: 0620 manufactured by American Specialties.

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- D. Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, nonslip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
  - 1. Length: 18, 24, 36 & 42 inches.
  - 2. Product: 3700-P manufactured by American Specialties.

### 2.05 UTILITY ROOM ACCESSORIES

- A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets, 3 mop holders/4 utility hooks 34" (860 mm) long.
  - 1. Product: 1308-3 manufactured by American Specialties.

### 2.06 SHOWER ROOM ACCESSORIES

- A. Towel Shelf with Towel Bar: Polished stainless steel, 3/4" bars.
  - 1. Size: 18" long.
  - 2. Projects 3 1/4" from wall.
  - 3. Product: Model 7310 by American Specialties.
- B. Shower Curtain Rod: Stainless steel tube, 1-1/4 inch outside diameter, 18-gage wall thickness, satin-finished, with 2-1/2 inch square stainless steel flanges, for installation with exposed fasteners.
  - 1. Product: Model 1214 by American Specialties.
- C. Shower Curtain: Opaque vinyl, 0.008 inch thick, matte finish, with antibacterial treatment, flameproof and stain-resistant.
  - 1. Size: Min. 60x72 inches, hemmed edges.
  - 2. Grommets: Stainless steel; pierced through top hem on 6 inch centers.
  - 3. Color: White.
  - 4. Shower curtain hooks: Chrome-plated or stainless steel spring wire designed for snap closure.
  - 5. Product: Model 1200-V & 1200-SHU by American Specialties.
- I. L-Shaped Four Leg Fold-Up Shower Seat: Ivory colored solid phenolic seat with stainless steel frame and legs.
  - 1. Size: 33-1/2" long x 14"/21" x 17"-18-1/4" high.
  - 2. Product: Model 8202 by American Specialties.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.

### 3.02 PREPARATION

- A. Provide templates and rough-in measurements as required.

### 3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights and Locations: As required by accessibility regulations, as indicated on drawings, and as follows:

## END OF SECTION

## **DIVISION 11 - EQUIPMENT**

### **SECTION 11450 - RESIDENTIAL EQUIPMENT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Break room appliances; microwave, and cooktop.

##### **1.02 RELATED SECTIONS**

- A. Section 16155 - Equipment Wiring: Electrical connections for appliances.

##### **1.03 REFERENCES**

- A. UL (EAUED) - Electrical Appliance and Utilization Equipment Directory; Underwriters Laboratories Inc.; current edition.

##### **1.04 SUBMITTALS**

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.
- B. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

##### **1.05 QUALITY ASSURANCE**

- A. Electric Appliances: Listed and labeled by UL and complying with NEMA standards.

##### **1.06 WARRANTY**

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Provide five (5) year manufacturer warranty on refrigeration system of refrigerators.
- C. Provide one (1) year manufacturer warranty on magnetron tube of microwave ovens.

#### **PART 2 PRODUCTS**

##### **2.01 KITCHEN APPLIANCES**

- A. Cooktop: In-the-counter.
  - 1. Capacity: 1-8" and 1-6" plug-in heating element.
  - 2. Power: 2.5 kw @ 208v, 20 amps.
  - 3. Features: 21" electric coil cooktop, stainless steel heat rotary controls, removable one-piece chrome drip bowls, and heating element "ON" indicator light. Equal to GE# JP201 CB.
  - 4. Finish: Stainless steel.
  - 5. Manufacturers:
    - a. General Electric Co.: [www.GEAppliances.com](http://www.GEAppliances.com).
    - b. Sears Kenmore: [www.sears.com](http://www.sears.com).
    - c. Whirlpool Corp: [www.whirlpool.com](http://www.whirlpool.com).
- B. Microwave: Over-the-counter.
  - 1. Capacity: 1.6 cubic ft.
  - 2. Power: 1000 watts.
  - 3. Features: Include turntable, cooktop light, 2-speed exhaust fan, and undercabinet mounting kit (size: 30" wide x 16" high x 12" deep).
  - 4. Finish: Black.
  - 5. Manufacturers:
    - a. General Electric Co.: [www.GEAppliances.com](http://www.GEAppliances.com).
    - b. Sears Kenmore: [www.sears.com](http://www.sears.com).
    - c. Whirlpool Corp: [www.whirlpool.com](http://www.whirlpool.com).

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify utility rough-ins are present and correctly located.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Anchor built-in equipment in place.

### **3.03 ADJUSTING**

- A. Adjust operating equipment to efficient operation.

### **3.04 CLEANING**

- A. Remove packing materials from equipment.
- B. Wash and clean equipment.

## **END OF SECTION**

## DIVISION 12 – FURNISHINGS

### SECTION 12492 - VERTICAL LOUVER BLINDS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Vertical louver blinds for Office 103 and Break Room 110 windows.
- B. Operating hardware.

##### 1.02 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating physical and dimensional characteristics.
- C. Samples: Submit two samples, 4 inch long illustrating slat materials and finish, color, cord type and color.

##### 1.03 EXTRA MATERIALS

- A. Provide ten additional slats.

#### PART 2 PRODUCTS

##### 2.01 MANUFACTURERS

- A. Vertical Blinds:
  - 1. Hunter Douglas Window Fashions.
  - 2. Levolor Home Fashions Contract Div.
  - 3. Springs Window Fashions Division, Inc.
  - 4. Substitutions: See Section 01600 - Product Requirements.

##### 2.02 BLINDS AND BLIND COMPONENTS

- A. Blinds: Vertical vinyl louvers hung from full-width headrail ; manual control of sliding louvers open and fully closed by cord with full range locking; blade angle adjustable by cord.
  - 1. Vinyl Slats: 3-1/2" wide, thickness 0.032".
  - 2. Color: Light Gray.
- B. Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats
  - 1. Color: Natural anodized aluminum, clear finish .
- C. Lift Cord: Braided nylon; continuous loop.
- D. Headrail Attachment: Head brackets.
- E. Accessory Hardware: Type recommended by blind manufacturer.

##### 2.03 FABRICATION

- A. Fabricate blinds to fit within openings with uniform edge clearance of 1/4 inch.

#### PART 3 EXECUTION

##### 3.01 EXAMINATION

- A. Ensure structural blocking and supports are correctly placed.

##### 3.02 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with concealed fasteners.

##### 3.03 ADJUSTING

- A. Adjust blinds for smooth operation.

##### 3.04 CLEANING

- A. Clean blind surfaces just prior to occupancy.

#### END OF SECTION

## SECTION 12800 - AUTO BAY CURTAIN

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Auto Bay Curtain for Wash Bay and Tire Change Bay separation.
- B. Operating track hardware and support structure.

#### 1.02 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating physical and dimensional characteristics.
- C. Samples: Submit two samples, 4 inch long illustrating materials and finish, color, cord type and color.

#### 1.03 QUALITY ASSURANCE

- A. Comply with NFPA-701 Tests for Fire Resistance.
- B. Verify that materials are water repellent, mildew and rot resistant, resistant to chemicals, withstands temperature of 180 degrees, and has a cold crack resistance to -40 degrees.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Auto Bay Curtain:
  - 1. Goff's Enterprises, Inc.; goffscurtainwalls.com; 800-234-0337.
  - 2. ALECO, Safe/Vue; 256-248-2402.
  - 3. Wilson Industries, Inc.; wilsonindustries.com; 800-423-4277.
  - 4. Substitutions: See Section 01600 - Product Requirements.

#### 2.02 BLINDS AND BLIND COMPONENTS

- A. Curtain: Reinforced 14 oz. vinyl curtain hung from curtain track or headrail, with threaded rod track support, utility mounting rack suspended from the roof purlins with threaded rod hanger; manual control of sliding curtain with reinforced edge.
  - 1. Solid Vinyl Bottom Section: 4'-0" high, with chain weight and grommets and elastic cords.
    - a. Color: Teal.
  - 2. Clear Vinyl Upper Section: 15'-6" high, 20 mils thick with vent flaps that open with wind blowing.
  - 3. Vinyl Upper Section: 6" high, with brass grommets.
- B. Track and Accessories: Pre-finished and/or non-corrosive finish; internally fitted with hardware, pulleys, and bearings for manual operation with nylon roller hooks.
  - 1. Color: Natural anodized aluminum, clear finish.
- C. Accessory Hardware: Type recommended by curtain manufacturer.

#### 2.03 FABRICATION

- A. Fabricate curtain to fit within the Bay opening width of +28', with uniform edge and wall clearance and an overlap with of 24" at both sides.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Ensure structural blocking and supports are correctly placed.

#### 3.02 INSTALLATION

- A. Install curtain in accordance with manufacturer's instructions. Secure in place with concealed fasteners where possible, provide elastic cords and anchor to side walls and floor to hold curtain from blowing.

#### 3.03 ADJUSTING

- A. Adjust curtain for smooth operation.

#### 3.04 CLEANING

- A. Clean curtain surfaces just prior to occupancy.

### END OF SECTION



## DIVISION 13 – SPECIAL CONSTRUCTION

### SECTION 13121 - PRE-ENGINEERED BUILDINGS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Pre-engineered, shop-fabricated structural steel building frame.
- B. Metal wall and roof panels including soffits.
- C. Exterior louvers and standard wall and roof insulation (see page 53 for roof insulation).

##### 1.02 RELATED SECTIONS

- A. Section 07213 - Pre-Engineered Building Insulation.
- B. Section 08110 - Steel Doors and Frames.
- C. Section 08360 - Overhead Doors.
- D. Section 08565 - Vinyl Windows.
- E. Section 14460 - Bridge Crane.

##### 1.03 REFERENCES

- A. AISC Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design; American Institute of Steel Construction, Inc.; 1989.
- B. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 1997a.
- C. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 1998.
- D. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- E. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 1997.
- F. ASTM A 325M - Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric); 1997.
- G. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 1999.
- H. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 1999.
- I. ASTM A 529/A 529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 1996.
- J. ASTM A 572/A 572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 1999a.
- K. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1999a.
- L. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 1998.
- M. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 1999.
- N. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 1998.
- O. MBMA (LR) - Low Rise Building Systems Manual; Metal Building Manufacturers Association; 1996, with Rev 1 (4/97).
- P. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 1991 (Part of Steel Structures Painting Manual, Vol. Two).
- Q. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Underwriters Laboratories Inc.; 1994.

##### 1.04 DESIGN REQUIREMENTS

- A. Design Criteria: Design building structure and enclosure to withstand the following loads and environmental conditions in combinations that produce the maximum stresses in each member or component as prescribed by "Design Standards" listed herein.
  - 1. Basic wind speed: 90 mph.
  - 2. Roof system shall meet the UL Class 90 wind uplift rating, the roof support structure and its fasteners must be designed, and installed to withstand the current NC Code required (ASCE 7-05) zoned wind uplift loads for components and cladding.

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- B. Design Standards: Comply with applicable requirements of:
  - 1. AISC "Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design."
  - 2. AISI "Specifications for the Design of Cold-Formed Steel Structural Members."
  - 3. MBMA "Low Rise Building Systems Manual."
- C. The current edition of the NC State Building Code.

## 1.05 SUBMITTALS

- A. Product Data: Manufacturer's specifications on all building components.
- B. Foundation Data:
  - 1. Structural data: Foundation reaction data indicating compression, tension, moment, and shear reactions at each point of connection between foundation and structural steel.
  - 2. Anchor bolts: Setting drawings and templates for location and spacing of anchor bolts.
- C. Shop Drawings: Show fabrication and erection of structure, building enclosure components, and accessories; signed and sealed by a professional engineer licensed in NC, certifying that the design complies with the above design criteria.
- D. Samples:
  - 1. Verification samples: Minimum 8- by 10-inch samples of finishes on actual substrate materials for the following items:
    - a. Roofing and Wall panels.
    - b. Windows.
- E. Certification: Written statement signed and sealed by a professional engineer licensed in the state in which the project is located, certifying that the design complies with indicated design criteria and requirements of governing authorities.
- F. Guarantee: Written guarantee as indicated in Article 42 of the Supplementary Instruction to Bidders and General Conditions of the Contract (20-year panel finish warranty and the roofing system shall have a 10-year manufacturer's warranty against leakage, and defects, etc.).

## 1.06 QUALITY ASSURANCE

- A. Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of North Carolina.
  - 1. Conform to applicable code for submission of design calculations as required for the shop drawing submittal.
- B. Perform work in accordance with AISC "Specification for Structural Steel Buildings--Allowable Stress Design, Plastic Design".
- C. Erector Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

## 1.07 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Provide 10 year manufacturer warranty for roof leak warranty.
  - 1. Include coverage for exterior pre-finished surfaces to cover pre-finished color coat against chipping, cracking or crazing, blistering, peeling, chalking, or fading; standard 20-30 year warranty. Include coverage for weather tightness of building enclosure elements after installation.

# PART 2 PRODUCTS

## 2.01 MANUFACTURERS

- A. Pre-Engineered Buildings: **VP Buildings\***, or
  - 1. Butler Manufacturing Co., or
  - 2. Ceco Building Systems., or Kirby Building Systems, or Metallic Building Co., or
  - 3. American, A&S, Mesco Metal Bldg's, Steelo Systems, Star, Inland Bldg's, or Gulf States Mfr.
  - 4. Substitutions: See Section 01600 - Product Requirements.

## 2.02 PRE-ENGINEERED BUILDING

- A. Dual span rigid frame w/ non-tapered columns.
- B. Bay Spacing: 21'-4" typical, unless otherwise noted.
- C. Primary Framing: Rigid frame of rafter beams and columns, canopy beams, intermediate columns, and end wall columns, and wind bracing.

## LINCOLNTON EQUIPMENT SHOP

- D. Secondary Framing: Purlins, and other items detailed.
- E. Wall System: Preformed metal panels of vertical profile, with sub-girt framing/anchorage assembly and insulation, and accessory components.
- F. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly, insulation, and insulation liner fabric, and accessory components.
- G. Roof Slope: 1 inches in 12 inches.
- H. End wall framing shall be non-expandable.

### 2.03 MATERIALS - FRAMING

- A. Structural Steel Members: ASTM A 36/A 36M.
- B. Structural Tubing: ASTM A 500, Grade B cold-formed.
- C. Plate or Bar Stock: ASTM A 529/A 529M.
- D. Anchor Bolts: ASTM A 307, galvanized to ASTM A 153/A 153M.
- E. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), galvanized to ASTM A 153/A 153M.
- F. Welding Materials: Type required for materials being welded.
- G. Primer: SSPC-Paint 20, Red Oxide.
- H. Grout: ASTM C 1107, Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 2400 psi in two days and 7000 psi in 28 days.

### 2.04 MATERIALS - WALLS AND ROOF

- A. Steel Sheet: Hot-dipped galvanized steel sheet minimum 26 ga. for wall panels and minimum 24 ga. for roof panels, ASTM A 653/A 653M, SS Grade 33/230, with G90/Z275 coating.
- B. Insulation and Facing: Standard 3" wall insulation with white vinyl facing (See Section 07213-Pre-Engineered Building Insulation for the roof insulation).
- C. Joint Seal Gaskets: Manufacturer's standard type.
- D. Fasteners: Manufacturer's standard type, galvanized to comply with requirements of ASTM A 153/A 153M, finish to match adjacent surfaces when exterior exposed.
- E. Sealant: Manufacturer's standard.
- F. Trim, Closure Pieces, Caps, Flashings, Rain Water Diverter: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

### 2.05 COMPONENTS

- A. Roof Insulation: Specified in Section 07213.
- B. Doors and Frames: Specified in Section 08110.
- C. Overhead Doors: Specified in Section 08360.
- D. Windows: Specified in Section 08565.
- E. Wall Louvers: Rectangular end wall and clerestory type Z blade design, same finish as adjacent material, with steel mesh insect screen and frame, blank sheet metal at unused portions.

### 2.06 FABRICATION - FRAMING

- A. Fabricate members in accordance with AISC Specification for plate, bar, tube, or rolled structural shapes.
- B. Anchor Bolts: Formed with bent shank of ASTM A 307 or A 36 steel, assembled with template for casting into concrete. Designer to verify length.
- C. Provide framing for clerestory and window openings.
- D. Exterior column base shall be considered as pinned connections.

### 2.07 FABRICATION - WALL AND ROOF PANELS

- A. **Siding:** Minimum 1-1/4 inch metal thickness, 26 gage min., Panel Rib profile, 36 inch wide with intermediate ribs at 12" o.c., male / female edges fitted with continuous gaskets.
- B. **Roofing:** Minimum 3 inch metal thickness, 24 gage min., Rolled standing seam profile (SSR), 24 inches wide, male/female edges fitted with continuous gaskets. Insulation blocks at purlins with roof insulation.
- C. **Soffit Panels:** Varco Pruden (FP-12) flush soffit panels, un-perforated.
- D. Girts/Purlins: Rolled formed structural shape to receive siding, roofing sheet.
- E. Internal and External Corners: Same material thickness and finish as adjacent material, profile brake formed to required angles. Back brace mitered internal corners with 3 inch thick sheet.
- F. Expansion Joints: Same material and finish as adjacent material where exposed, manufacturer's standard brake formed type, of profile to suit system.
- G. Flashings, Closure Pieces, Fascia: Same material and finish as adjacent material, profile to suit system.

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- H. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive finish.
- I. **Snow Guard:** Provide Snow Guard at each roof panel lower edge equal to the Original Snow-Gem, 3M adhesive, 888-SNO-GEMS, or equal to roof panel mfr's standard (VP Buildings or Butler Manufacturing Co.).

## 2.08 FABRICATION - GUTTERS AND DOWNSPOUTS

- A. Fabricate of same material and finish as roofing metal.
- B. Form gutters and downspouts of standard profile and size indicated to collect and remove water. Fabricate with connection pieces.
- C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints.
- D. Fabricate support straps of same material and finish as roofing metal, color as selected.

## 2.09 FINISHES

- A. Framing Members: Clean, prepare, and shop prime.
- B. Exterior Surfaces of all Wall, Fascia, and Soffit Components and Accessories: Precoated enamel on steel of Kynar finish, **"Hemlock Green" color, V-P Buildings Division, and of all Roof; "White" color.**

# PART 3 EXECUTION

## 3.01 EXAMINATION

- A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

## 3.02 ERECTION - FRAMING

- A. Erect framing in accordance with AISC Specification for Structural Steel Buildings.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Do not field cut or alter structural members without approval.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

## 3.03 ERECTION - WALL AND ROOF PANELS

- A. Install in accordance with manufacturer's instructions.
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.
- E. Provide expansion joints where indicated.
- F. Use concealed fasteners.
- G. Install insulation and vapor retarder utilizing liner fabric and strapping for attachment to underside of purlins, see Section 07190 and install roof panels after Insulation blocks or minimum roof insulation is installed over purlins for a thermal break (separate from the roof insulation system).
- H. Install sealant and gaskets to prevent weather penetration.

## 3.04 ERECTION - GUTTERS AND DOWNSPOUTS

- A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.
- B. Slope gutters minimum 1/16 inch/ft.
- C. Install splash pans under each downspout.

## 3.05 INSTALLATION - ACCESSORIES

- A. Seal wall and roof accessories watertight and weather tight with sealant in accordance with Section 07900.

## 3.06 TOLERANCES

- A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.
- B. Siding and Roofing: 1/8 inch from true position.

# END OF SECTION

## DIVISION 14 - CONVEYING SYSTEMS

### SECTION 14460 - BRIDGE CRANE

#### PART 1: GENERAL

##### 1.1 SCOPE:

- A. Related Work Specified Elsewhere:
  - 1. Structural Steel (Section 05120)
  - 2. Electrical (Section 16)
- A. Work Included In this Section: Furnish and install Bridge Crane, crane rails and standard controls as specified herein with all incidental components required for the system to be ready for use. Electrical trade shall have final power connection only.

##### 1.2 STANDARDS:

- A. Comply with CMAA 74 single girder cranes Class C and all applicable requirements of ANSI B-30.17 and OSHA Par. 1910.179.

##### 1.3 SUBMITTALS:

- A. Submit manufacturer's comprehensive product data for all equipment. Provide installation, operation and maintenance instructions along with manufacturer's parts breakdown, product warranty, and address and telephone number of the nearest service representative.

##### 1.4 MANUFACTURER:

- A. Subject to compliance with requirements and equal to **Mid-Atlantic Crane & Equipment Co.\*, (919) 790-3535**.
  - 1. Approved equals by DeShazo Crane Co., Duff-Morton, Co., Shaw Box, Detroit Hoist, and Yale Industries Products will be acceptable.

#### PART 2 PRODUCTS

##### 2.01 MATERIALS

- A. Bridge Crane: Quality standard for this installation shall be **Mid-Atlantic Crane & Equipment Co.\*** 3 ton single girder top running crane with span of 72' rail to rail center line. Three ton hoist with a bridge speed of 80 feet per minute with inverter control, with a hoist speed of 15/5 fpm (two speed) and a trolley speed of 50 fpm with inverter control.
- B. Beam: Bridge beam shall be designed in accordance with latest specifications of the Crane Manufacturers Association of America and shall be of standard structural shapes, constructed in accordance with AISC specifications. Under full load the beam deflection shall not exceed 1/800 of the span. Bridge beam shall be selected structural steel members and shall provide level and straight tread surfaces for the hoist trolleys. The bridge beam shall be braced and welded to maintain squareness with trucks. Bridge beam shall have adequate lateral stiffness with minimum lateral moment of inertia of 1/20 that of the vertical moment of inertia. Provide tapered top ends of bridge beam as indicated.
- C. End Trucks: The end truck frame shall be welded from structural shapes into a single unit as to prevent distortion and mismatch of gears under maximum rated loads. End truck wheel base shall be a minimum of 1/8 of crane span. One wheel in each truck shall be rotating axial direct drive. The truck shall contain diaphragm members welded to truck frames to maintain alignment and distribute truck loads uniformly on inner and outer truck members. The truck shall be designed so that the drop of the truck will be limited to one inch in case of axle or wheel failure. Attachment of end truck to bridge beam shall be by welding to insure alignment.
- D. Crane Wheels: Crane wheels shall be double-flange alloy steel and have tread surfaces hardened to 375 to 425 Brinell. Each wheel shall be supported on tapered roller bearings mounted on stationary axles suitable to take radial and thrust loads. The wheels shall be lubricated at the factory with sodium-based grease and provided with a suitable reservoir of lubricant to eliminate the need for field lubrication. Wheel axles must have mounting nuts for bearing adjustment. Wheel mounting shall be designed so that axles and wheels can be removed without disturbing other truck elements of their alignment. Wheel treads shall be smooth, true and uniform within .010 inch tread diameter on all wheels.

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- E. Runways: Crane ASCE rails, and stops shall be furnished to the General Contractor as instructed and coordinated with the information provided by the crane manufacturer. Runway rails shall be straight, parallel, level, and at the same elevation. The distance center to center and the elevation shall be within a tolerance of plus or minus 1/8". The runway rails should be standard rail sections of a proper size for the crane to be installed and must be provided with proper rail splices. See Section 05120.
- F. Crane Drive: Each end truck shall be provided with a helical gear motor reducer. The drive motor for each truck shall be fully enclosed, 30 minute duty rated Class B insulation in a NEMA frame and shall comply with NEMA Performance Specifications. A spring set, electrically released AC disk type brake shall be integrally mounted on each reducer in line with the motor. The motors shall be integral with fully enclosed oil splash lubricated gear reducers, 2-speed motor. The gear reduction shaft shall be supported by precision ball or roller bearings.
- G. Bearing Life: All bearings in the crane wheels and the gear reduction shafts shall be designed for 5,000 hours B-10 bearing life minimum.
- H. Bridge Bumpers: The bridge shall be provided with bumpers capable of stopping the crane, not including the live load, at a rate of deceleration not to exceed three feet per second when traveling in either direction at 20% of rated speed. The bumpers shall have sufficient energy absorbing capacity to stop the crane when traveling at a speed of at least 40% of the rated load speed.
- I. Rail Sweeps: Bridge trucks shall be equipped with sweeps which extend below the top of the rail and project in front of the crane wheels.
- J. Electrical Controls: Electrical controls shall use a voltage of 110 V, 60 H, 1- ph. Bridge control shall include a main line Contractor, manually operated fused main line disconnect with lock-out provision, branch circuit fuses, frequency inverter bridge control and transformer with a fused secondary. Bridge control shall be mounted on bridge in NEMA Type 3R enclosure activated from a pendant push button station from a festooned C-track. Crane drive motor (2 @ 1/2 hp) and hoist motor to operate on a supply voltage of 208 V, 3 Phase, 60 Hertz.
- K. Bridge Conductors Wiring: Flat wire festoon bridge conductors shall be provided with the crane to provide fully insulated bridge electrification. All other wiring of the crane shall be in rigid or flexible conduit in accordance with National Electrical Code.
- L. Rope Hoist: Standard headroom electric wire rope hoist with motorized trolley and two speed hoist motor. Right and left hand grooving for true vertical lift. Controls to be 3 pole magnetic reversing type in a NEMA Types 3R enclosure with momentary contact type buttons. Weston load brake in hoist gear box shall hold fully capacity load independent of motor brake and can hold the load stationary in any position, 208 v, 3 phase, 60 Hz.
- M. Painting: All structural parts shall be cleaned of rust and mill scale. The complete crane shall be given the appropriate number of coats of anti-corrosion primer and finish paint to protect surface from environmental damage. Type of paint and color of final coat shall be according to manufacturer's standard.

## PART 3: EXECUTION

### 3.1 INSTALLATION:

- A. Comply with manufacture's detailed instructions, and coordinate crane rail erection with crane manufacturers instructions. Install complete system in working order. Provide necessary adjustments required for safe and efficient operation. Load test at 125% of rated capacity using certified weights by OSHA. Certified weights by crane supplier.

## END OF SECTION

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## SECTION 15A – PLUMBING

### SECTION 15010 - GENERAL PROVISIONS

#### PART 1 - GENERAL

##### 1.01 SCOPE:

The scope of the plumbing phase of this project shall include all labor, materials; equipment, etc., required to fulfill the intent of the Contract Documents and shall include the work specified under the subsequent sections of Division 15 of these specifications.

##### 1.02 RELATED DOCUMENTS:

All applicable provisions of the general conditions shall govern work under this Division. Refer to these articles in the specifications for additional information.

##### 1.03 REFERENCE STANDARDS:

1.03.1 All work shall be performed in full accordance with the latest editions of the applicable state, and national building codes and local ordinances.

1.03.2 Refer to each section for applicable codes and reference standards.

##### 1.04 FEES, PERMITS AND TAXES:

This Contractor shall make arrangements for and pay for all inspection fees, connections fees and permits required by local authorities. The Contractor shall also pay all taxes levied for labor and materials associated with work under this Division.

##### 1.05 SUBMITTALS:

1.05.1 The symbol "<S>" indicates a requirement for submittals.

1.05.2 In addition to the requirements of the above referenced portions of this specification, all contractors proposing to do work under this Division shall comply with the following additional requirements:

A. These specifications and drawings are intended to indicate a standard of quality for materials and equipment which is established by the listing of manufacturers' names and catalog numbers and/or by referenced standards. Materials and equipment that do not comply with these standards of quality will not be considered for substitution.

B. As soon as practicable and within thirty (30) days after the award of the contract and before beginning the fabrication of any material or the installation of any equipment, data shall be submitted for approval on equipment and materials where noted. Materials (pipe,

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fittings, etc.) may be listed with the name of the manufacturer and identifying catalogue numbers. Data for equipment shall include manufacturer's name, catalogue data, diagrams, drawings and other descriptive data as required or requested by the Architect/Engineer for evaluation.

C. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalogue number, such references shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product material, fixture, form or type of construction which in the judgment of the Architect/Engineer expressed in writing, is equal to that specified.

D. All data shall be carefully examined and shall be forwarded for approval with a signed certification to the effect that the data has been carefully checked and found to be correct with respect to dimensions and available space and that the equipment complies with all requirements of the specifications.

E. Point out in writing all deviations between the plans and specifications and the materials submitted.

F. It is understood that proof of equality is the responsibility of the Contractor and/or supplier and that it is not the responsibility of the Architect/Engineer to prove the inequality of the proposed substitutions. Furthermore the decisions of the Architect/Engineer are final.

1.05.5 While it is not the intention of the Architect/Engineer to discriminate against any manufacturer of equipment which is equal to specified equipment, a strict interpretation of such equality will be exercised by the Architect/Engineer in considering any equipment offered as a substitute for equipment named in the specification. It shall be the responsibility of the Contractor to submit with each request for approval of substitute material or equipment, sufficient data to show conclusively that it is equal to the material or equipment specified.

1.05.6 Each Contractor shall submit shop drawings and/or diagrams for approval and for job coordination in all cases where significant deviations from the contract drawings are contemplated because of job conditions, interferences, or substitutions of equipment, or when requested by the Architect/Engineer for purposes of clarification of the Contractor's intent. He shall also submit detailed shop drawings, rough-in sheets, etc., for all special or custom built items of equipment.

1.05.7 Submittal of shop drawings shall be made in sufficient copies to provide one (1) copy of all data to be retained by the Engineer; two (2) copies of all data to be accumulated for the Owner; one (1) copy of all data to be retained by the Contractor; one (1) copy of all data to be retained by the architect.

1.05.8 Should any substitute items be submitted and disapproved, then those items must



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be furnished exactly as described herein.

1.05.9 The review of shop drawings and/or submittal data shall not relieve the Contractor of responsibility for deviations from the contract drawings or specifications.

1.05.10 The size of mechanical equipment shown on the drawings is based on the dimensions of a particular manufacturer. While other manufacturers may be acceptable, it is the responsibility of the Contractor to determine if the equipment he proposes to furnish will fit in the space. Shop drawings shall be prepared when required by the Architect/Engineer or Owner to indicated a suitable arrangement.

1.05.11 One quarter (1/4) inch scale reproducible shop drawings shall be prepared and submitted for approval to indicate a suitable arrangement in all mechanical rooms, to include but not limited to piping, fittings and valves, equipment and accessories. All drafting shall be done by a qualified draftsman. The engineer reserves the right to request resumes of drafting personnel or drafting service.

### 1.06 OPERATING AND MAINTENANCE MANUALS AND INSTRUCTIONS:

1.06.1 The symbol "<OM>" indicates a requirement for operating and maintenance manuals to be furnished.

1.06.2 The Owner's operating personnel shall be instructed by the Contractor on how to start and operate each item of equipment. Safety features shall be pointed out, particularly the possible troubles which might cause the safety controls to operate and what might be done to remedy the trouble.

1.06.3 Provide (4) four copies of operating and maintenance manuals. Manuals shall be bound in large ring, loose-leaf binders and contain the following:

- A. Manufacturer's instructions and/or installation manual.
- B. Manufacturer's service manual.
- C. Manufacturer's lubrication chart listing types of lubricant to be used on each item of equipment and recommended frequency of lubrication.
- D. Electrical diagrams of each equipment "packaged" control system.
- E. Parts lists and identifying part numbers with prices of each part. The name and address of the nearest distributor from which parts can be obtained.

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### 1.07 WARRANTY

1.07.1 This contractor shall warrant all workmanship, material, equipment systems, etc., provided by him for a period of one year after final acceptance of the project by the owner. This warranty means that this contractor shall make good to the Owner, at no cost, any defects that become apparent during the year. This warranty is in addition to any other guarantees or warranties and is not intended to limit such other guarantees or warranties.

1.07.2 This contractor shall give a letter of guarantee stating the dates the guarantee period begins and ends. Furnish the Architect/Engineer with (3) copies of letter of guarantee.

1.08 DEFINITIONS: The following words and phrases as used herein are hereby defined:

1.08.1 "provide": Furnish and install all material and labor required for a complete installation ready for operation in accordance with the intent of the Contract Documents.

1.08.2 "as required": Indicates that the Contractor shall perform the work or provide the material as indicated in accordance with manufacturer's installation instructions; and in accordance with applicable codes or regulations; and in a workmanlike manner as defined by good local practice.

1.08.3 "or equal": Indicates that the Contractor may substitute equipment by another manufacturer if the salient features of the equipment indicated by manufacturer's name and/or described are, in the judgment of the Architect/Engineer, adequate. Submittals for approval are required where indicated.

1.08.4 "contractor": Where the word(s) "Contractor" or "this Contractor" is/are used, that refer to the Contractor engaged to execute the work under this division of the specifications only, even though he may be technically described as a sub-contractor.

1.08.5 "intent of the Contract Documents": The specific intent of these documents is to provide to the Owner, in a thoroughly functional condition, all the various systems, equipment, etc., indicated herein. Final authority over interpretation of the "intent" shall rest with the Architect/Engineer.

1.08.6 "shall": Indicates a mandatory requirement.

### 1.09 INSPECTION OF THE SITE:

1.09.1 The drawings are prepared from the best information available and reflect all conditions commensurate with this information. However, the contractor shall visit the site prior to submitting a proposal and should verify the locations, sizes, depths, pressures, etc., of all existing utilities and familiarize himself with working conditions, hazards, existing grades, soil conditions, obstructions, etc. If it becomes evident that existing site

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conditions will impair the proper operation of the utilities, the Architect/Engineer shall be notified in writing.

1.09.2 All proposals shall take these existing conditions and any revisions required into consideration.

1.09.3 The submission of a bona fide bid will be considered as evidence that the contractor has inspected the job site and understands the conditions under this contract work must be fulfilled.

1.09.4 Contract cost changes will be negotiated for conditions found during construction which were not visible to a thorough on-site inspection and which were unknown to the Architect/Engineer or Contractor prior to receipt of bids.

### 1.10 CONSTRUCTION REQUIREMENTS:

1.10.1 The Contractor shall be responsible for fitting his material and apparatus into the building and shall carefully lay out his work at the site to conform to the structural conditions, to provide proper grading of lines, to avoid all obstructions and to conform to the details of the installation supplied by the manufacturer of the equipment to be installed. Furnish all necessary pilot lines and control lines whether indicated on the drawings or not. The drawings do not give exact details as to elevations of pipe lines nor do they show exact locations of pipe to scale. Piping elevations shall be handled by giving precedence to pipes which require a stated grade for proper operation. Devices necessary for installation and support of pipes, and equipment (such as sleeves, inserts, etc.) shall be located and installed as the construction progresses in order to allow completion of each phase of the work in the proper sequence.

1.10.2 Drawings showing the extent and arrangement of the work of a particular trade shall be used together with drawings showing extent and arrangement of work of other trades to insure that the Contractor in laying out and installing his work shall do so in a manner such that the work of the several trades may progress in the most direct, workmanlike and harmonious manner.

1.10.3 The Contractor shall be responsible for the proper location and size of slots, holes or openings in the building structure pertaining to his work, and for the correct location of pipe sleeves. The drawings indicate the extent and general arrangement of the various systems, but if any departures from these drawings are deemed necessary by the contractor, detailed drawings and descriptions of these departures and a statement of the reasons therefore shall be submitted to the Architect/Engineer as soon as practicable. No departures from the arrangements shown on the drawings shall be made without prior written approval of Architect/Engineer.

1.10.4 In general, piping in finished areas of the building shall be run concealed unless noted and directed otherwise. Should any conditions arise which would cause any piping to be exposed in finished areas, it shall be immediately called to the Architect/Engineer's

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attention. In unfinished spaces such as equipment rooms, all pipe shall be run as high as possible, shall be run to a continuous grade and shall be grouped wherever it is feasible to do so.

1.10.5 Equipment shall be installed in such a manner to make oiling devices and parts requiring service and maintenance readily accessible.

1.10.6 All pipe, etc., shall be cut accurately to measurements established at the building and shall be worked into place without springing or forcing. All pipes run exposed in machinery and equipment rooms shall be installed parallel to the building planes except that the lines shall be sloped to obtain the proper pitch. Piping run above furred ceilings, etc., shall be similarly installed, except as otherwise shown. All pipe openings shall be kept closed during construction until the systems are closed with final connections.

1.10.7 The construction details of the building are illustrated on the Architectural and Structural Drawings. The trades shall thoroughly acquaint themselves with the details before submitting their bid as no allowance will be made because of unfamiliarity with these details. For new construction, place all inserts to accommodate the ultimate installation of pipe hangers in the forms before concrete is poured and set sleeves in forms before construction. For existing construction, all required inserts shall be "drilled-in" and all openings required through concrete or masonry shall be "saw-cut" or "core drilled" with tools specifically designed for this purpose. Explosive or compression driven inserts shall only be allowed for use as approved by the manufacturer of these devices. All concealed lines shall be installed as required by the pace of the job to precede the general construction.

1.10.8 The plumbing plans do not give exact locations of outlets, fixtures, equipment items, etc. The exact location of each item shall be determined by reference to the general plans and to all detail drawings, equipment drawings, roughing-in drawings, etc., by measurements at the building and in cooperation with other trades. Minor relocations necessitated by the conditions at the site or directed by the Owner shall be made without additional cost to the Owner.

1.10.9 All oiling devices and all parts of equipment requiring adjustment shall be easily accessible. Equipment shall be so located and installed as to permit convenient and safe maintenance and future replacement. The contractor furnishing the equipment shall be responsible prior to ordering same in the event that equipment specified and/or approved is incompatible with this requirement.

### 1.11 SLEEVES:

1.11.1 Each and every pipe, regardless of material, which passes through a concrete slab, (except slab on grade), masonry wall, roof or other portion of the building structure shall be free from the structure and shall pass through a sleeve furnished and installed by this contractor responsible for the work involved.

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1.11.2 Above grade and dry location sleeves shall be constructed from 20 to 22 gauge galvanized or black steel and shall be flush on both sides of wall surface penetrated. The sleeves shall be sized to allow free passage of the pipe to be inserted, and when this pipe is to be insulated, the sleeves shall be large enough to pass the insulation. Floor sleeves located in pipe chases shall extend up two inches (2") above the floor slab. Allow for expansion and contraction movement of the piping.

1.11.3 Sleeves passing through walls or floors on or below grade and/or in moist areas shall be constructed of galvanized steel, schedule 40 steel pipe and shall be designed with suitable flange in the center of the floor or wall to form a waterproof passage. After the pipes have been installed in the sleeves, void space around the pipe shall be caulked to insure a waterproof penetration. Fire ratings of rated walls and floors shall be maintained by the use of approved materials.

1.11.4 Sleeve ends shall be cut straight and true by power saw or roll cutter. Torch cut ends will not be acceptable.

### 1.12 ISOLATION

1.12.1 Transmission of perceptible vibration, structure-borne noise, or objectional air borne noise to occupied areas by equipment installed under this contract will not be permitted.

1.12.2 The isolation supplier shall be a firm or individual capable of dealing effectively with vibration and noise characteristics, effects and criteria and have facilities and capabilities for measuring and evaluating such disturbances and the preparation of drawings and installation instructions.

### 1.13 CONSTRUCTION SAFETY:

This contractor assumes all responsibility regarding the safety of his personnel on the project during construction. The Contract Documents do not include materials, procedures, components, etc., required to insure construction safety. Refer to General Conditions and Supplementary General Conditions for additional information.

### 1.14 DAMAGE:

1.14.1 This Contractor shall be responsible for damage to project caused by this Contractor's failure to recognize hazards associated with items such as leaks, scheduling of work, inexperienced workmen, excessive cutting, etc.

1.14.2 This Contractor shall repair, at no expense to the Owner, any such damage.

1.14.3 This contractor shall familiarize himself with working conditions to the extent that he shall be responsible for damage to concealed piping, wiring and other equipment to remain and shall repair any damage caused by his negligence at no cost to the Owner.

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### 1.15 FLOOR, CEILING AND WALL PLATES:

1.15.1 Refer to General Conditions.

1.15.2 In addition to the requirements of the above referenced portions of this specification, this contractor shall furnish a chromium plated sectional escutcheon in each finished space on each pipe or hanger rod penetrating a wall, floor or ceiling. Escutcheons shall be sized to fit snugly to all lines and where the lines are insulated, the escutcheons shall be fit snugly over the insulation. These plates shall be provided with set screws so that they fit snugly against the finished surface. All equipment rooms are classified as finished space.

### 1.16 IDENTIFICATION:

1.16.1 Each piece of equipment; every valve whose service and/or duty is not readily apparent; each zone duct, outside air duct and return air duct whose duty is not immediately apparent; every piping system except cast iron sewer lines, shall be permanently and clearly identified.

1.16.2 Equipment, valves, etc. shall be provided with laminated phenolic nameplates, appropriately engraved with proper identification correlated to the designation shown on the drawings. Punched plastic tape will not be acceptable.

1.16.3 Piping systems shall have designation on twenty foot (20'-0") centers and closer where required to provide adequate identification, using Seaton "Set Mark" pipe markers with direction of flow and service indication. Exposed piping systems and piping located in mechanical rooms shall be painted and stenciled identifying the system. Color scheme shall be as follows:

Fire Line	- Red
Gas Pipe	- Yellow
Domestic Water	- Green

1.16.4 All these pipe markers shall conform to ANSI-A-13 "Scheme for the Identification of Piping Systems". Arrow markers must have the same ANSI background colors as their companion pipe markers. All marks shall be as manufactured by Seaton or approved equal.

1.16.5 A typewritten chart, framed under glass, shall be provided which shall correlate all such identification, abbreviations, valve numbers, color schemes, etc.

1.16.6 Contractor shall obtain written approval of proposed identification scheme prior to application.

1.16.7 Provide engraved rigid phenolic, 3" x 1" with 1/4" minimum letters fastened to the

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ceiling grid "tee" bar at each location where a branch stop valve or group of valves is located above the adjacent ceiling tile. The tag shall be engraved "Domestic Water Branch Valve Located Above."

### 1.17 SAFETY GUARDS:

Contractor shall furnish and install all safety guards required. All belt driven equipment, projecting shafts and other rotating parts shall be enclosed or adequately guarded.

### 1.18 STORAGE OF MATERIALS:

Each contractor shall provide space for storage of materials, equipment or tools at ground level. Any storage contemplated within the building will be allowed only upon specific approval of the Architect.

### 1.19 SUPERVISION:

All work under this contract shall be under the direct supervision of a competent foreman thoroughly experienced in the type work being performed. If, in the opinion of the Architect/Engineer, the foreman is not "running" the job satisfactorily, he shall be replaced by a foreman acceptable to the Architect/Engineer. The job foreman shall not be removed from the project without written notice from the contractor to the Architect/Engineer.

### 1.20 MANUFACTURERS' DIRECTIONS:

The manufacturers' published directions shall be followed in the delivery, storage, protection, installation, piping and wiring of all equipment and material. The Contractor shall promptly notify the Architect/Engineer in writing of any conflict between the requirements of the contract documents and the manufacturers' directions and shall obtain the Architect's/Engineer's instructions before proceeding with the work. Any such work performed that does not comply with the manufacturers' directions shall have deficiencies corrected at no cost to the Owner.

### 1.21 ROCK EXCAVATION:

1.21.1 All loose or soft rock shall be removed from excavations without extra cost to the Owner. Should rock be encountered, the Plumbing Contractor shall notify the Architect/Engineer so that the volume of rock to be removed can be computed and the unit price for its removal negotiated (if the unit price is not otherwise stated in the contract) prior to its removal.

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1.21.2 Rock shall be defined as large (not removable by a 1/2 cubic yard mechanical digger) solid material yielding a metallic ring when struck with a metal hammer and requiring drilling and blasting.

1.21.3 The Plumbing Contractor shall obtain and import from another source the necessary amount of earth required for interior and exterior fills. Such earth shall be clean clay which is free from top soil or any form of vegetation. Earth shall be suitable for the purpose intended and approved by the Architect/Engineer.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS:

All materials shall be new and free from defects at the time of installation. Materials or equipment damaged in shipment or otherwise damaged prior to installation shall not be repaired at the job site, but shall be replaced with new materials.

#### 2.02 MANUFACTURER'S REQUIREMENTS:

When a manufacturer's name appears in these specifications, it is not to be construed that the manufacturer does not have to meet the full requirements of the specifications or that his standard cataloged item will be acceptable.

#### 2.03 SERVICE AND REPAIR PARTS:

All equipment installed on this project shall have local representation, local factory authorized service, and a local stock of repair parts.

#### 2.04 FLAME SPREAD PROPERTIES OF MATERIALS:

All materials and adhesives used for insulation shall conform to NFPA and UL life, safety and flame spread properties of materials. The composite classifications shall not exceed 25 for a flame spread rating and 50 for a smoke developed rating for these classifications as listed for the basic materials. The finishes, adhesives, etc., specified for each system and shall be such when completely assembled.

#### 2.05 ACCESS PANELS:

Provide "KARP" or approved equal flush mounted metal access panels and frames with concealed hinges and key actuated locks for all concealed and otherwise inaccessible valves, parts, fittings, equipment, filters, etc. and as required for inspection or service.



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### PART 3 - EXECUTION

#### 3.01 WORKMANSHIP:

3.01.1 All work shall be done by experienced craftsmen skilled in the applicable trade.

3.01.2 Sloppy work shall be rejected and corrected at no additional expense.

#### 3.02 PROTECTION OF EQUIPMENT:

The Contractor shall continuously maintain adequate protection of stored materials and installed equipment. Fixtures and equipment, located inside or outside shall be protected against dirt, rust, moisture and abuse from other trades. Materials and equipment shall not be stored directly on the ground. Piping and equipment shall not be used by other trades as supports for scaffolds for personnel. At the completion of the work, equipment, fixtures, exposed supports and piping shall be vacuumed free of loose dirt and cleaned to the satisfaction of the Architect/Engineer. Repairs made necessary by damage shall be paid for by the Contractor. Acceptance by the Owner of piping systems in no wise relieves the contractor of the responsibility of correcting systems malfunctioning or replacing valves damaged as a result of dirt or debris left inside the equipment or piping during construction.

#### 3.03 PROTECTION OF STRUCTURE:

Each Contractor in performing his work shall take particular care not to damage the structure. All finished floors and step treads shall be covered to prevent any damage by workmen or their tools and equipment during the construction of the building. In addition, each Contractor shall protect any materials on the job site whether a part of this contract or the property of another Contractor.

#### 3.04 LARGE EQUIPMENT:

All large pieces of equipment which will be installed in the building, and which are too large to permit access through doorways, stairways or shafts, shall be brought to the job by the Contractor and placed in the spaces before the enclosing structure is closed in.

#### 3.05 FOUNDATIONS:

3.05.1 Concrete foundations required by plumbing equipment shall be constructed by this Contractor. See Concrete Work.

3.05.2 Equipment shall be set in place on the bases, leveled and aligned by means of shims, piped, then grouted in, in that order. After grouting, the forms shall be removed and the surfaces of the foundation shall be hand-rubbed with carborundum. Concrete work shall conform to the requirements of General Specifications, Concrete Work, of this specification.

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### 3.06 CONFLICTS, INTERFERENCES AND COORDINATION BETWEEN TRADES:

3.06.1 The drawings are not to be construed as shop drawings, but indicate the extent, general location, arrangement, etc., of piping systems and equipment. This Contractor shall refer to other sections of the specifications and other drawings such as electrical, structural, architectural, etc., in order to eliminate conflicts and undue delays in the progress of the work. Where other Contractors furnish items requiring piping connections by this Contractor, they will be held responsible for providing roughing-in drawings and assistance upon request.

3.06.2 Each trade shall so harmonize its work with that of the other trades so that the work may be done in the most direct and workmanlike manner without hindering the other trades. Piping interference shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. Where space requirements conflict, the following order of precedence shall be observed:

- A. Building lines
- B. Structural members
- C. Soil and drain piping
- D. Vent piping
- E. Refrigerant piping
- F. Condensate piping
- G. Ductwork
- H. Domestic water
- I. Electrical conduit
- J. Natural gas piping

3.06.3 In the event of conflicts between specifications and drawings, drawings shall take precedence over specifications except in matters pertaining to quality, applications, and coordination between trades, which shall be governed by specifications.

3.06.4 Code and regulation requirements govern where drawing and/or specifications are in conflict with any code or regulation. However, where drawings and specifications exceed the requirements of any code or regulation, the drawings and specifications shall govern. If the Contractor observes that the drawings and specifications are at variance with applicable codes, he shall promptly notify the Architect/Engineer in writing and any

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necessary change shall be negotiated as provided in the contract for changes in the work. If the contractor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations, and without prior notice to the Architect/Engineer, he shall bear all costs of labor and material necessary to rectify unacceptable work or installation.

3.06.5 In the event of conflict between manufacturer's installation instructions and the drawings, the manufacturer's installation instructions shall govern.

### 3.07 CUTTING AND PATCHING:

3.07.1 All cutting required by the installation of sleeves, piping, equipment, etc., shall be coordinated with the General Contractor, but performed by this Contractor. Patching shall be by the General Contractor. This Contractor shall not cut any structural element or any finished work without written permission from the Architect/Engineer. Failure of the Plumbing Contractor to furnish his requirements prior to building construction and failure to coordinate his work with other contractors shall make the Plumbing Contractor responsible for cost of proper removal (chasing) and repair of general construction work to provide for installation of the plumbing work. Written approval shall be obtained from the Architect/Engineer before cutting any structural member or finished work. The cost of cutting and reinforcing of any structural member to accommodate plumbing work shall be the responsibility of the Plumbing Contractor and shall be done by craftsmen experienced in the craft involved and in a manner acceptable to the Architect/Engineer. All Plumbing pipes penetrating walls shall be sealed in rated and non-rated walls.

3.07.2 This Contractor shall cut and patch all paving as required by the installation of buried piping, including utilities.

### 3.08 CONCRETE WORK:

This Contractor shall provide all forming, reinforcing and concrete as indicated such as equipment bases, plumbing stack support pads, grease interceptors and headwalls. Work shall conform to applicable portion of Division 3 CONCRETE.

### 3.09 PAINTING:

3.09.1 The Plumbing Contractor shall "touch up" paint, to restore to original "new" appearance, all equipment installed under this contract on which the factory applied finish was damaged or scratched during construction or which does not have a finished paint or other outer coating and which is not otherwise to be painted by the General Contractor. This shall include pumps, tanks, cast iron valves, manhole covers, meter box covers, valve box covers, cast iron cleanout covers and cast iron floor grates, both inside and outside the building. Surfaces shall be wire brushed to remove all dirt, scale and mortar prior to painting with flat black rust preventive paint suitable for damp atmosphere.

3.09.2 Exposed copper pipe and bronze body and copper body valves and fittings shall be thoroughly cleaned with a rubbing of fine steel wool.

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3.09.3 All structural steel, hangers, rods, etc., installed by this contractor whether concealed or exposed shall be wire brushed to remove dirt and scale and painted with one (1) full cover coat of rust preventive primer, Rust-o-leum #X-60, or approved equal. Hangers in concealed areas need not be painted unless otherwise specified. Surfaces inaccessible after placement shall be painted prior to placement.

### 3.10 TRENCHING AND BACKFILL:

3.10.1 All necessary excavation and backfill for the installation of plumbing work shall be accomplished by this contractor under his phase of the work. All such work shall be included regardless of the type of materials encountered in the excavation.

3.10.2 Trenches for all underground piping shall be excavated to the required depths. The banks of trenches shall be kept as nearly vertical as practicable and where required shall be properly formed and braced. Trenches shall be not less than 12" wider than the outside diameter of the pipe to be laid therein. The bottoms of the trenches shall be tamped hard and graded to secure proper fall. Bell holes shall be excavated to a depth 6" below the bottom of the pipe and shall be backfilled to the proper grade with pea gravel or sand thoroughly tamped. Pipe laid in trenches dug in fill shall be supported down to load bearing undisturbed soil. After the pipes have been tested, inspected and approved by inspecting authorities, the trenches shall be backfilled.

3.10.3 The trenches beneath and within six feet of the building shall be carefully backfilled with an approved river sand to a depth of six (6) inches above the top of the pipe. The next layer and subsequent layers of backfill may be excavated materials if of earth, loam, sand or gravel free of large clods and with rocks no larger than 1 - 1/2" in diameter. Backfill shall be installed in layers 12" deep, adequately tamped and wetted down before the next layer of earth is laid in place. This additional material required for backfilling shall be furnished and any excess materials and debris shall be removed from the site. Any special backfill material shall be provided as specified or shown on the drawings.

3.10.4 All excavating and backfilling shall be done in a manner so as not to disturb adjacent structures and any shoring required shall be provided.

### 3.11 LUBRICATION:

This Contractor shall provide all lubricants for the operation of all equipment until acceptance. The Contractor shall be required to protect all bearings during the installation and shall thoroughly grease steel shafts to prevent corrosion. All motors and other equipment shall be provided with covers as required for proper protection during construction. All equipment bearings requiring periodic lubrication shall be provided with proper fittings for this purpose. Where equipment requiring such lubrication is not readily accessible due to location, copper tubing extensions shall be provided in addition to lubrication fittings.

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### 3.12 ELECTRICAL WORK:

3.12.1 Under Division 16, power wiring shall be provided up to termination point consisting of a junction box, trough, starter or disconnect switch. Under Division 16 line side terminations shall be provided. Wiring from the termination point to the mechanical equipment, including final connections, shall be provided under Division 15 (Plumbing and Mechanical). Combination disconnects/ motor starters shall be provided by the respective plumbing or mechanical contractor unless specifically stated otherwise in these specifications.

3.12.2 Wiring for all controls and interconnecting wiring for the installation of power wiring will be done under Electrical Work. The furnishing of all disconnect switches as required for proper operation as shown on the drawings and required by code will be under Electrical Work, except where specifically designated on the plans. The furnishing of all starters for equipment will be done under this section (Plumbing) of these specifications.

3.12.3 Furnishing of complete wiring diagrams showing power wiring and interlock wiring shall be work under the trade supplying the equipment. Diagrams shall be based on approved equipment and shall be complete integral drawings, not a series of manufacturer's individual diagrams. After these diagrams have been approved by the Architect/Engineer, copies shall be furnished to the trades involved and they shall be followed in detail.

3.12.4 The electrical design and drawings are based on the equipment scheduled and shown on the drawings and should any plumbing equipment requiring changes to the electrical design be approved, the required electrical changes shall be made at the expense of the trade furnishing the changed equipment and at no cost to the Owner.

### 3.13 EQUIPMENT CONNECTION:

This Contractor shall bring required services to equipment items furnished under other sections of this specification or by the Owner, make final connections, and leave equipment ready for operation. Where it is necessary for Contractors performing work covered by this section to make final connections to items of equipment being furnished by Contractors under other sections, all such work shall be performed in a neat and workmanlike manner and all materials shall be of quality and finish normally used for such installation.

### 3.14 OPERATION PRIOR TO COMPLETION:

When any piece of mechanical or electrical equipment is operable and it is to the advantage of the Contractor to operate the equipment, he may do so providing that he properly cleans the equipment, installs clean filter media, properly adjusts and completes all punch list items before final acceptance by the Owner. The date of acceptance and the start of the warranty may not be the same date.

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### 3.15 EQUIPMENT AND ARRANGEMENTS:

All equipment shall be installed in a manner to permit access to all surfaces requiring access. All valves, motors, drives, lubrication devices, filters and other necessary items shall be installed in a position to allow removal for service without disassembly of another part.

### 3.16 EXECUTION OF WORK:

The Contractor shall plan, schedule and execute his work and that of any of his Sub-contractors so as not to interfere with the work of other trades or Contractors in the building or on the premises.

### 3.17 FLASHING AND WATERPROOFING:

All building penetrations to outside shall be flashed and counter flashed as required to eliminate leaks.

### 3.18 TESTS:

All tests shall be made by this Contractor and repeated until approved by the Architect/Engineer. Piping systems shall not be covered or otherwise concealed until tests have been made and approvals obtained. Notify the Engineer two days prior to tests to allow for scheduling. Test the piping systems as indicated in applicable articles.

### 3.19 CLEAN-UP:

3.19.1 It shall be the responsibility of each trade to cooperate fully with the other trades on the job to help keep the job site in a clean and safe condition. At the end of each day's work, each trade shall properly store all of his tools, equipment, any surplus materials and all debris caused by his portion of the work.

3.19.2 When all work has been finally tested, the Contractor shall clean all work installed by him, including all fixtures, equipment, pipes, etc. and all exposed work. All pipes shall be flushed out and left free of all obstructions. All plates, access doors, floor drains, clean out covers and other finished products shall be thoroughly cleaned and polished.

### 3.20 FINAL INSPECTIONS:

3.20.1 It shall be the duty of the Contractor to make a careful inspection trip of the entire project, assuring himself that the work on the project is ready for final acceptance, before calling upon the Architect/Engineer to make a final inspection.

3.20.2 In order not to delay final acceptance of the work, the Contractor shall have all necessary bonds, guarantees, receipts, affidavits, etc., called for in the various articles of

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this specification, prepared and signed in advance, and together with a letter of transmittal listing each paper included, and shall deliver the same to the Architect/Engineer at or before the time of the final inspections. The Contractor is cautioned to check over each bond, receipt, etc., before preparing same for submission to see that the items check with the requirements of the specification.

### 3.21 DEMOLITION AND SALVAGE:

3.21.1 Where demolition of equipment or materials is required this Contractor shall minimize cutting and exercise all due caution to leave undamaged surfaces, material and equipment meant to remain.

3.21.2 All existing items that are to be removed shall remain the property of the Owner unless declared as unsalvageable. Unsalvageable materials shall become the property of the Contractor and be removed from the site. Items declared as Owner's property shall be neatly stored on the site as directed by the Owner.

### 3.22 VIBRATION ISOLATION AND SEISMIC RESTRAINT:

All equipment and piping furnished and installed under this contract shall be seismically restrained as required by Chapter 16, STRUCTURAL DESIGN, in the North Carolina Building Code, 2009 Edition. Specific attention shall be given to Section 1621, ARCHITECTURAL, MECHANICAL AND ELECTRICAL COMPONENT SEISMIC DESIGN REQUIREMENTS. The Plumbing Contractor shall include in his/her bid price the cost to accomplish all requirements of the aforementioned code.

### 3.23 CLOSE OUT CERTIFICATES:

The Plumbing Contractor shall deliver to the Architect/Engineer, prior to or in conjunction with his request for final payment, the original and two (2) copies each of:

Inspection certificates previously herein specified.

Plumbing Contractor's letter of Guarantee.

Equipment manufacturer's warranties, operation and maintenance manuals for pumps, water heaters, faucets, etc.

Certificate of factory representative's check out and start up of the gas water heater.

Affidavit of Payment of Debts and Claims (AIA Form G706).

Affidavit of Release of Liens (AIA Form G706A).

Consent of Surety to Final Payment (AIA Form G707).

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Letter certifying that all materials used on this project do not contain asbestos.

**END OF SECTION**



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## SECTION 15100 - PIPING SYSTEMS

### PART 1 - GENERAL

#### 1.01 SCOPE:

Work in this section shall include piping, fittings, accessories etc., to be used in piping systems in accordance with the intent of the Contract Documents and shall include the following principal items:

Piping  
Valves  
Piping Accessories

#### 1.02 REFERENCED STANDARDS:

National Bureau of Standards (NBS).  
Cast Iron Soil Pipe Institute (CISPI).  
American Society of Testing & Materials (ASTM).  
American Water Works Association (AWWA).  
National Fire Protection Association (NFPA).  
Factory Mutual Engineering Corporation (FM).  
American Society of Mechanical Engineers (ASME).

#### 1.03 SUBMITTALS:

Submittals are required as indicated only. Submittal of pipe and fittings is not required unless a deviation from the specification is proposed.

### PART 2 - PRODUCTS

#### 2.01 DOMESTIC WATER PIPING (HOT AND COLD):

2.01.1 Domestic water piping 4" or larger size, and exterior to the building, shall be Class 150 AWWA C110 tar-coated cast iron water pipe per ASTM A-377-66. Pipe smaller than 4" shall be Type "K" copper, per ASTM B-88-71 or B-42-71.

2.01.2 Piping, larger than 3", and under the building slab shall be standard weight ductile iron with AWWA approved mechanical gasketed and clamped bell and spigot joints or Type "K" copper, per ASTM B-88. Underground steel piping shall not be allowed for domestic water.

2.01.3 Domestic water piping, 1-1/2" and smaller in size, and under the building slab shall be type "K" soft drawn commercially pure copper water pipe, per ASTM B-88. The use of joints in the piping beneath concrete slabs will be avoided and will be permitted only to the extent of long runs where a single

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roll of length of copper tubing is not of sufficient length to complete the piping run. Should a joint be required, the joint shall be made with silver-fo solder and wrought solder joint copper fittings. Pipe larger than 4" shall be Class 150 AWWA C110 tar coated ductile iron water pipe. Pipe 2" to 4" shall be Type-K hard copper per ASTM B-88 with silver-fo solder and wrought fittings.

2.01.4 Domestic water piping, 3" and smaller in size and within the building and above ground, shall be type "L" hard drawn commercially pure copper joint fittings per ASTM B-88 and hard solder. Flux shall be a non-corrosive paste type. Cored solder will not be allowed; all solder shall be a solid string or wire type. Where soldered copper piping must be connected to screwed brass pipe, a cast brass adaptor shall be used. Piping shall be assembled with 95-5 tin/antimony solder or 95-5 tin/silver solder. No solder containing lead shall be used. Foreign made copper piping is prohibited. Solder joints in copper pipe shall be made with 95% tin, 5% antimony solder up to and including 1 ¼" pipe. Use brazing solder for joints in pipes above 1 ¼".

2.01.5 Water piping connections to fixtures or equipment shall be made by use of brass pipe or nipples, chrome plated where exposed to view in finished areas, screwed into copper to IPS adaptor fittings. Ferrous piping connections will not be used in copper piping systems.

2.01.6 Dielectric insulating couplings shall be provided between ferrous and copper piping systems.

2.01.7 Domestic water piping control valves shall be provided by this Contractor where required to adequately control and isolate the various domestic water piping systems. Valves shall be as manufactured by Nibco, Crane, Apollo, Jenkins, American or Grinnel and equal to Nibco numbers as stated below:

- A. Gate valves throughout the domestic water piping shall be equal to Nibco solder joint, 125 lb., rising stem double-disc bronze gate valves.
- B. Globe valves shall be equal to Nibco, solder joint, 125 lb. brass globe valve.
- C. Check valves shall be equal to Nibco, 125 lb., brass check valve with "Buna-N" disc.
- D. T& P relief valves shall be ASME rated Watts valve or approved equal.
- E. Ball valves shall be equal to Apollo with stainless steel balls.

2.01.8 On each cold supply where serving urinals and/or water closets, provide a manufactured water hammer protective device. These shall be of the size recommended by the manufacturer for the particular application and installed in accordance with Plumbing and Drainage Institute Standard PDI-WH201. Install Access door at each shock arrestor. On all other hot and cold water supplies provide an air chamber the same size as

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the supply to the fixture and not less than 24" long. These air chambers shall be located directly behind the supply connection to the fixture and shall have a capped top, shall be constructed of the same material as the piping system in which they are installed, and shall be insulated in the same manner as the balance of the piping system in which they are installed.

### 2.02 SANITARY DRAINAGE:

2.02.1 All sanitary drainage line (soil, waste and vent) shall be cast iron soil pipe and fittings per ASTM A74-75, coated inside and out and shall be labeled with the C.I. mark of quality and permanence as illustrated in Commercial Standard CS-188-59, which indicates that it complies with this standard. Weight of pipe shall be Class "SV" service weight. Joints shall be fabricated by the use of compression type joints similar to Tyler Pipe and Foundry's "Ty-Seal" with resilient gasketed joint will be acceptable. "No Hub" piping will be acceptable but shall be limited to above ground installation. Any drain line subject to contamination by oil, gasoline, or any other petroleum product shall have "BUNA-N" gaskets, approved for that service.

2.02.2 Horizontal waste, soil pipe and vent shall be given a grade of 1/4" per foot where possible and not less than 1/8" per foot. Where practicable, two or more vents shall be connected together and extended as one vent through the roof. Vent and waste connections to stacks shall be made by the appropriate use of forty-five (45) degrees wyes, long sweep quarter bends, sixth, eighth, or sixteenth bends as approved by local codes except that sanitary tees and sanitary crosses shall be used on the connection to vertical stacks. Make vent connections at least 4 feet above floor on which fixture vented is located to prevent use of vent lines as waste. Vent pipe penetrating and extending above the roof shall be 2 inch diameter minimum. Locate vents in roof at least 10 feet from nearest operable window, door, or mechanical equipment.

The Plumbing Contractor shall supply and install weather tight flashing at each point where work installed by the Plumbing Contractor penetrates the roof. Flashing shall be fabricated from four (4) pound per square foot sheet lead. Flashing base collar shall be a minimum of twelve (12) inches wide - vertical sleeves shall extend to the top of the vent stack and terminate under the vent cap as detailed on the contract drawings. Vent caps shall be Zurn Series Z-196-3 or Z-196, Wade Series W-3670 or W-3670-C.

2.02.3 All vents shall be routed to the back side of each roof; at least 10' from air intakes. Vents shall be extended at least 18" above roof and shall be flashed per roofing manufacturer requirements as detailed on drawings.

1. Metal Roof - Use a 1 piece flexible base recommended by the metal roofing manufacturer. The base shall be E.P.D.M. rubber with a ductile aluminum alloy reinforcing base ring bonded to a rubber flange on the base of the flashing unit.
2. Other Roof Types - Use 4 lb. lead with the base extending at least 10" in

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every direction from stack. The vertical portion of the flashing shall extend upward. The entire length of the vent pipe shall be turned down inside the pipe at least 2" to provide a weather-tight joint.

2.02.4 Vents of 1-1/2" in nominal size or smaller shall be made by the use of Schedule 40 galvanized steel pipe joined with galvanized, screwed, malleable iron fittings per ASTM A-120-55 or type "M" or "DWV" hard drawn copper pipe per ASTM B-88, assembled with cast copper fitting, joined as specified under "Domestic Water Piping".

2.02.5 Cleanouts shall be provided at each change in direction of the soil lines, at the end of each continuous waste line, at the foot of each riser within the building and at 50'-0" intervals on 3" waste lines and 75'-0" intervals on 4" waste lines in long horizontal lines except as noted. The sizes of cleanouts shall be identical with the size of soil or waste lines in which they are placed, except that cleanouts larger than four inches (4") in diameter will not be required. Cleanouts must be placed in accessible locations and where they occur in pipe chases, said cleanouts shall be placed above the floors in such a manner that they will be accessible through doors or they shall be brought through the wall and provided with flush covers. Exact locations of each shall be approved by the Architect before installation. All cleanouts shall be of the type specifically designed for installation in the type of wall in which they are installed. Wherever cleanouts shall occur in finished floors, they shall be specifically designed for the type of floor in which they are installed. All cleanouts located in exterior locations shall be encased in 14" x 14" x 6" concrete pads unless installed in a walk drive or other paved area. All cover plates on cleanouts shall be attached with vandal-proof screws.

2.02.6 Each fixture and piece of equipment requiring connection to the sanitary drainage system, except fixtures with integral traps, shall be equipped with a trap. Each trap shall be placed as near to the fixture as possible and no fixture shall be double trapped unless permitted by governing codes.

2.02.7 Hub drains and floor drains connected to the sanitary drainage system shall be provided with deep seal P-traps.

### 2.03 CONDENSATE DRAIN PIPING AND WATER HEATER RELIEF PIPING:

Condensate drain piping and water heater relief piping 1" and smaller shall be type "L" hard drawn copper piping with cast and/or wrought copper fittings per ASTM B-88, 95/5 solder.

### 2.04 PIPING ACCESSORIES GENERAL:

2.04.1 Flanges shall be slip-on or butt welding standard weight 1/16" raised face type with gaskets.

2.04.2 Unions shall be all bronze for copper systems and malleable iron with ground joint for steel piping systems. Provide dielectric unions for joining dissimilar metallic piping

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systems.

2.04.3 Weldolets and threadolets shall be steel per ANSI B16.9.

2.04.4 Escutcheons shall be single piece, set screw type, chrome plated and shall cover the opening and sleeve.

### 2.05 THERMOMETERS, PRESSURE GAUGES AND TEST PLUGS:

2.05.1 Provide thermometers and pressure gauges where shown on drawings and where required for testing and balancing system. The instruments shall be of the same manufacturer throughout.

2.05.2 Pipe thermometers <S> shall be adjustable angle type equal to Weksler type AA5, with separable socket. Thermometers shall have cast aluminum cases with baked enamel finish, red reading mercury tubes with black scale graduations, and glass covers. Scales shall be a minimum of 9 inches with appropriate ranges for indicating temperatures at least 25% above and below normal readings. Sockets shall have stem length suitable for pipe receiving thermometer. Sockets on insulated pipes shall have lagging extensions of adequate length to clear insulation.

Acceptable manufacturers: Marsh, Trerice, Weksler

2.05.3 Pressure gauges <S> shall be bourdon tube with minimum accuracy 1.5% of full scale, equal to Weksler type CA1. Gauges shall have direct mounting aluminum cases, not less than 4-1/2" dials, black scale graduations, and glass cover. Scales shall have a minimum arc of 260 degrees with appropriate ranges for indicating pressures at least 25% above normal operating range.

Gauges shall be installed with 1/4", 250 psi brass tee handle cocks, equal to Weksler type A10, and filter type pressure snubbers, equal to Weksler type BW42. Provide pigtails for pressure gauges in steam service.

Acceptable manufacturers: March, Trerice, Weksler

## PART 3 - EXECUTION

### 3.01 PIPING INSTALLATION:

3.01.1 The piping systems required under the Plumbing division of these specifications shall be installed in a neat and workmanlike manner. All pipe hangers shall be of the type mentioned in this section and shall be so spaced and installed as to maintain a rigid piping system, adequately supported both laterally and vertically.

3.01.2 All domestic piping systems shall be installed level and the low points of all risers shall have gate valves 1/2" in size installed with hose ends in order to adequately drain

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the system.

3.01.3 At each group of plumbing fixtures and at each piece of equipment, gate valves shall be furnished and installed by this Contractor so that these groups of fixtures or pieces of equipment may be isolated from accessible locations. Provide General Contractor with locations of all access doors. Access doors required for these valves shall be furnished by this Contractor.

3.01.4 Each of the piping systems shall be installed to provide for expansion and contraction and the joints shall be soldered at such time that the system is not under strain.

3.01.5 Necessary spring pieces and offsets shall be furnished by this Contractor as required.

3.01.6 Each of the piping systems shall be concealed in chases and above ceilings and in walls in all finished areas and shall be run exposed only as specifically specified or as shown on the drawings in machinery spaces or unfinished areas.

3.01.7 Exposed piping shall be held close to the walls and ceilings and necessary fittings shall be provided and installed to allow for offsets to hold the piping close to wall and ceilings.

3.01.8 All valves shall be so located as to make the removal of their bonnets possible. All flanged valves shown in the horizontal positions shall be mounted with valve stem inclined one bolt hole above the horizontal lines shall be "made-up" with valve stem inclined at an angle of thirty (30) degrees above the horizontal position. All valve stems must be true and straight at the time the system is tested for final acceptance.

3.01.9 Pipe shall be cut accurately to measurements established at the site and worked into place without springing or forcing.

3.01.10 Provide clearance for installation on insulation and for access to valves, drain and unions.

3.01.11 Provide a 1/2" thick foam plastic insulating sleeve-protector on all copper and plastic piping penetrations of concrete slab-on-grade prior to pouring of concrete.

3.01.12 Locate and suspend piping in such a manner so as to minimize transmission of vibration and noise.

3.01.13 All piping penetrations through fire rated ceilings, walls or floors shall be fire stopped using approved materials to maintain the fire rating of the ceiling, wall or floor structure.

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3.01.14 All piping connections to equipment and fixtures shall contain flanges or unions to allow easy removal whether or not shown on the plans.

### 3.02 PIPING JOINTS:

3.02.1 Screwed joints shall have full cut pipe threads. Joints shall be assembled with an approved compound applied to only the male threads. A minimum of three pipe threads shall remain exposed when the joint is assembled.

3.02.2 Mechanical coupling joints shall be assembled in strict accordance with the recommendations of the coupling joint manufacturer. The bolts, fasteners, gaskets and lubricants shall be a product of, or shall adhere rigidly to, the specification requirements of the joint manufacturer.

3.02.3 Solder joints shall be assembled with square cut pipe using a pipe cutter. Hack saw cut pipe ends shall be reamed to full size. Both the pipe and fittings shall be furnished absolutely clean. Brazing flux shall be applied to both the pipe and the fittings. The use of corrosive acid flux will not be permitted. During the brazing, the pipe and fittings must be charged with nitrogen gas.

### 3.03 SECURING AND SUPPORTING OF PIPE:

3.03.1 All pipe shall be supported from the building structure by means of approved hangers and supports. Piping shall be supported to maintain required grade and pitch, prevent vibration and provide for expansion/contraction.

3.03.2 All hangers shall be secured to approved inserts wherever possible and practicable. Hanger inserts shall be set in place before concrete is poured. Where hangers attach to the structural steel framing, approved beam clamps shall be employed. Where required, the contractor shall install channels to span between framing members. In no case shall spacing of hangers be greater than indicated on the following schedule:

#### FERROUS (SCHEDULE 40) PIPING

<u>NOMINAL PIPE SIZE (MAXIMUM)</u>	<u>HANGER SPACE</u>
1/2"	5'-0"
3/4"	6'-0"
1"	7'-0"
1-1/2"	8'-0"
2" to 2-1/2"	10'-0"
3" to 6"	12'-0"

#### COPPER (WATER TUBE) PIPING

<u>NOMINAL PIPE SIZE</u>	<u>HANGER SPACE</u>
--------------------------	---------------------

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### (MAXIMUM)

Up to 3/4"	6'-0"
1" to 1-1/2"	8'-0"
1-1/2" to 2"	10'-0"
Larger than 2"	12'-0"

### CAST IRON PIPING

#### NOMINAL PIPE SIZE      HANGER SPACING

##### (MAXIMUM)

All pipe sizes                      One hanger per joint in pipe and not exceeding 5'-0" O/C

3.03.3 Vertical lines shall be adequately supported at their bases, either by a suitable hanger placed in the horizontal line near the riser, or by a base fitting set on a pedestal or foundation and from each floor slab by means of approved clamp type support bearing on the slab or beam.

3.03.4 Hangers for piping 2" and smaller shall be of the split cast ring type with fastening device. Hangers for piping larger than 2" shall be of the adjustable clevis hanger type. Hanger rods shall be minimum 3/8" diameter and shall have machine threads. Brackets of approved type may be used along walls. Hanger rods for individually suspended horizontal pipes shall be steel rods of size indicated on the following table:

#### NOMINAL PIPE SIZE              ROD SIZE

##### (MAXIMUM)

1/2" to 2"	3/8"
2-1/2" to 3"	1/2"
4"	5/8"
5" to 6"	3/4"
8" to 12"	7/8"

3.03.5 Hangers for use with copper piping shall be copper plated ferrous sizes for copper tubing.

3.03.6 Hangers shall be installed within 2'-0" of each change in direction, either vertical or horizontal, or pipe tee and on each side of valves, strainers, etc.

3.03.7 Multiple horizontal pipes, smaller than 12" diameter pipe, may be supported on trapeze hangers. Trapeze spacing shall be in accordance with the schedule for pipe spacing based upon the smallest pipe. The trapeze members shall be properly sized for the piping load they are to support.

3.03.8 Where "cold" pipes are insulated with a vapor sealing jacket, the hanger shall be oversized accordingly to accommodate the outside diameter of the insulation, and half-round 16 gauge galvanized steel shields, not less than 14" long, rolled to fit the insulation



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diameter, shall be provided between the insulation and the hanger.

3.03.9 Pipe supports shall be as manufactured by Michigan Hanger, Grinnel, or F&S Manufacturing.

3.03.10 All equipment and piping furnished and installed under this contract shall be seismically restrained as required by Chapter 16 of the North Carolina State Building Code, Volume 1 - General Construction and specifically Section 1607.6.4 and Table 1607.6.4A which relates to Mechanical and Electrical components.

### 3.04 SCHEDULE OF PLUMBING BRANCHES:

The size of branches or runouts to each fixture shall be as indicated on the drawings. Where no size of connection is indicated, connection shall be not less than in accordance with the following schedule or local plumbing code:

<u>Fixture</u>	<u>Waste</u>	<u>Vent</u>	<u>C.W.</u>	<u>H.W.</u>
Water Closet	4"	2"	1"	---
Lavatories	2"	1-1/2"	1/2"	1/2"
Urinals (Wall Mtd)	2"	1-1/2"	3/4"	---
Sinks	2"	1-1/2"	1/2"	1/2"
Mop and Service Sinks	3"	2"	1/2"	1/2"
Floor Drains	4"	2"	---	---
Hose Bibbs	---	---	1/2"	---
Drinking Fountains	2"	1-1/2"	1/2"	---

### 3.05 EQUIPMENT PLUMBING CONNECTIONS:

3.05.1 The Plumbing Contractor shall rough-in for connections to all miscellaneous equipment noted on the drawings. Final connections to the equipment shall be a part of this contract.

3.05.2 The Plumbing Contractor shall make final connections to all pieces of equipment furnished under this contract that require natural gas, water, drain, waste or vent connections, furnishing all required shutoff cocks, valves, drain valves and traps.

### 3.06 TESTING REQUIREMENTS:

Refer to sections 15480 for further testing requirements.

**END OF SECTION**

## LINCOLN TON EQUIPMENT SHOP

### SECTION 15460 - PLUMBING FIXTURES, EQUIPMENT AND DRAINS

#### PART 1 - GENERAL

##### 1.01 GENERAL:

Refer to Section 15010 for General Requirements for mechanical work.

##### 1.02 SCOPE OF WORK:

1.02.1 Furnish and install all labor, materials, equipment, tools and services and perform all operations required in connection with or properly incidental to the installation of complete plumbing fixtures and plumbing equipment, as indicated on the drawings, reasonably implied therefrom, or as specified herein, unless specifically excluded.

1.02.2 Plumbing fixtures shall be supplied, set and connected as listed herein and as shown on the drawings. Fixtures shall be protected from damage during construction and shall be thoroughly cleaned of all tape and adhesive prior to final acceptance.

1.02.3 Special mounting heights of plumbing fixtures shall be coordinated with architectural details of each toilet area.

##### 1.03 SUBMITTALS:

Submittals are required as indicated.

##### 1.04 REFERENCE STANDARDS:

North Carolina State Plumbing Code  
Local City/County Plumbing Code

#### PART 2 - PRODUCTS:

##### 2.01 FITTINGS AND PIPES:

2.01.1 Fittings and piping in connection with plumbing fixtures shall be brass and, wherever exposed, shall be polished, chrome-plated. Provide tight fitting wall or floor escutcheons of chrome-plated brass wherever pipes pass through walls, floors and ceilings.

2.01.2 Furnish and install all required water, waste, soil and vent connections to all plumbing fixtures and equipment, together with all fittings, supports, fastening devices, cocks, valves, traps, etc., leaving all in complete working order.

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### 2.02 FIXTURES:

2.02.1 All plumbing fixtures shall be new, first quality, free from marks or chips and shall be furnished with sufficient support in order to adequately hang each and every unit.

2.02.2 Each and every unit shall be complete with all required trim and all exposed piping and trim shall be polished chrome-plated, all brass. Each and every fixture shall be furnished with stop valves whether specifically shown and/or specified or not, and all such stop valves shall have a metal-to-metal seat.

2.02.3 Each piece of trim, supply fittings, etc., shall be furnished whether correctly specified or not in order to securely fit the fixture involved to the particular roughing-in available.

### 2.03 PLUMBING FIXTURES: <S>

See drawings for fixture specifications.

### 2.04 CLEANOUTS: <S>

2.04.1 CLEANOUTS SHALL BE AS FOLLOWS:

Floor Cleanouts - in finished areas - Zurn #ZN-1400-T with Square nickel bronze top

- in tile floors - Zurn #ZN-1400-T
- in terrazzo floors - Zurn #ZN-1400-Z
- in carpeted floors - Zurn #ZN-1400-CF

Wall Cleanouts - Zurn #Z-1441 with Stainless Steel coverplate

Cleanouts in exposed piping - Zurn #ZN-1440

Exterior cleanouts - Zurn #Z-1400 w/nickel bronze top

2.04.2 Cleanouts in waterproof floor shall have flashing flange and clamping device.

2.04.3 Cleanouts in carpeted areas shall be provided with carpet markers.

### 2.05 WATER HAMMER CONTROL: <S>

2.05.1 Arrestors shall be sized and applied in accordance with the Plumbing and Drainage Institute Standard PDI-WH-201. Equipment equal to Zurn #Z-1700 or equal by Amtrol, Wade, Sioux Chief or Smith is acceptable.

2.05.2 Provide "KARP" access cover in wall to service water hammer arrestors.

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### 2.06 VACUUM BREAKERS: <S>

2.06.1 For hose bibb, sill cock, yard hydrants, and wall faucets: Woodford #34H or equal.

2.06.2 For turf irrigation systems and water heaters without dip tubes: Watts #288A or equal.

### 2.07 <S> DOMESTIC HOT WATER CIRCULATORS:

Hot water circulating pumps shall be manufactured by Bell and Gossett, Taco or Thrust and shall have capacities as scheduled on the drawings. The pumps shall be all bronze construction and shall be furnished complete with a manual motor starter equal to Square "D" Class 2510.

## PART 3 - EXECUTION:

### 3.01 INSTALLATION:

3.01.1 Plumbing fixtures and equipment shall be set in place, leveled and connected as indicated on the drawings. Fixtures shall be protected from damage during construction and shall be thoroughly cleaned of all tape and adhesive prior to final acceptance.

3.01.2 Verify exact location and mounting height of wall hung and handicapped fixtures with architectural drawings before roughing-in.

3.01.3 Contractor shall set and connect all fixtures, including fixtures and equipment furnished by others, in strict accordance with the manufacturer's printed instructions and applicable industry standards as indicated.

3.01.4 Caulk around wall mounted fixtures with fine continuous bead of white silicon sealant.

3.01.5 Supplies to each fixture or piece of equipment shall be valved for service.

3.01.6 All drains shall be trapped and vented.

3.01.7 Connection between china and soil pipe flanges shall be made gas and water-tight with one-piece molded gasket.

3.01.8 Do not install aerators on faucets until system has been flushed out and sterilized.

3.01.9 Provide china bolt caps for water closet mounting studs.

**END OF SECTION**

# LINCOLN TON EQUIPMENT SHOP

## SECTION 15470 - INSULATION

### PART 1 - GENERAL

#### 1.01. GENERAL:

Refer to Section 15010 for General Requirements for mechanical work.

#### 1.02 SCOPE OF WORK:

The Contractor shall cover all piping and apparatuses, as specified below, with insulation as manufactured by Johns-Manville, Owens-Corning, Armstrong, Imcoa or approved equal. All insulation, jacket, facing and adhesive shall have composite ratings not exceeding flame spread of 25 and smoke development of 50. All pipe insulation shall meet all requirements of the International Energy Code.

### PART 2 - PRODUCTS:

#### 2.01 DOMESTIC HOT AND COLD WATER PIPING:

2.01.1 All hot and cold water piping shall be insulated using a molded pipe insulation with a factory applied all-service jacket (ASJ) and two-component adhesive closure system sized to fit the piping. The circumferential joints shall be sealed with butt strips that are compatible with ASJ facing. The minimum thickness of the insulation shall be 1" or as required by the NC Energy Conservation Code, 2009 Edition. This insulation material shall be a "Universal" white all service jacket with flap. All hot and cold water piping 1-1/4" and larger shall be insulated 2" fiberglass.

Fittings and valves shall be insulated with pre-formed fiberglass fittings and finished with PVC fitting covers. The fittings shall be insulated as prescribed above, jacketed with preformed fitting covers matching outer jacketing used on straight pipe sections, with all joints sealed.

Hot water piping under floor-on-grade shall be insulated with Armaflex insulation to meet the requirements of the NC Energy Conservation Code and the NC Plumbing Code, 2009 Edition. Cold water piping under floor-on-grade and within three foot (3') of an exterior wall shall be insulated with Armaflex insulation to meet the requirements of the NC Plumbing Code, 2009 Edition.

2.01.2 Thermal insulation shall be applied with a minimum of joints with particular attention to longitudinal joints. All joints shall be tightly butted and carefully adhered with Armstrong #620 adhesive, or approved equal, as recommended by the insulation manufacturer. Adhesive shall be applied to the entire joint surface so that the resultant finished joint, both butt and longitudinal, is free of voids.

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### 2.02 CONDENSATE DRAIN PIPING:

All condensate drain piping including sewer mains carrying condensate from air conditioning units that runs outside of fan housing shall be insulated with 1/2" thick molded fiberglass with a "Universal" white vapor barrier jacket with flap. Furnish manufacturer rigid fitting covers.

### PART 3 - EXECUTION:

#### 3.01 PROCEDURES:

3.01.1 All piping insulation shall be the product of reputable manufacturers and shall be applied and installed by an independent contractor engaged in the insulating business. The materials shall all be applied in accordance with the published standards of the manufacturer of the materials, using any special materials as required by these specifications and by those published standards. Unskilled work shall be just cause for rejection.

3.01.2 All sectional covering shall finish round and smooth, without lumps or depressions and all end and joints shall butt evenly and tightly together and to the covered surface. No broken or damaged section shall be used. When covering is formed from blocks, they shall be carefully and evenly applied, securely wired in place and joints shall be closed with cement insulation.

3.01.3 In instances where insulated lines pass into other areas, wherein the line will not be insulated as described herein, the insulation shall not terminate at the wall, but shall extend full size a minimum of 1" beyond the wall.

3.01.4 Engage the services of a qualified insulation applicator to furnish and install all the insulation required for the mechanical equipment, piping, etc., specified herein.

3.01.5 All surfaces to be insulated shall be clean and dry before applying insulation. All sections of molded pipe covering shall be firmly butted together. No insulation shall be applied until the pipe, duct, etc., have been pressure tested and found tight. Piping flexible connections, flanges and unions shall not be covered unless specifically noted. Flexible connections on ducts shall not be covered.

3.01.6 Prior to the installation of any insulating material to ferrous piping systems, the piping surfaces shall be thoroughly cleaned of all mill scale, grease and dirt and shall be given a coat of rust inhibiting primer.

3.01.7 Refer to Section 15010, for flame spread properties of insulating materials.

3.01.8 Where vapor barriers are required, the vapor barrier shall be on the outside. Extreme care shall be taken that the vapor barrier is unbroken. Joints, etc., shall all be

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sealed. Where insulation with a vapor barrier terminates, it shall be sealed off with the vapor barrier being continuous to the surface being insulated. Ends shall not be left raw.

3.01.9 All Armaflex insulation exposed to the weather shall be coated with a weatherproof finish recommended by the manufacturer and contain an aluminum metal jacket.

3.01.10 Armaflex insulation shall be slid on unslit or shall be applied with contact cement. Duct tape, electrical tape, staples, etc., shall not be permitted.

3.01.11 Metal jackets shall have side and end lap at least 2-inches wide with the cut edge of the side lap turned inside one inch to provide a smooth edge. Overlap the jacket not less than 2 inches at longitudinal and circumferential joints and secure with metal bands at not more than 9-inch centers or with screws at not more than 5-inch centers. Overlap longitudinal joints down to shed water. Seal circumferential joints with a coating recommended by the insulation manufacturer for weatherproofing.

3.01.12 Materials containing asbestos shall be prohibited.

**END OF SECTION**

## LINCOLN TON EQUIPMENT SHOP

### SECTION 15480 - CLEANING AND TESTING

#### PART 1 - GENERAL:

##### 1.01 GENERAL:

1.01.1 Refer to Section 15010 for General Requirements for Mechanical Work.

##### 1.02 SCOPE OF WORK:

1.02.1 This Contractor shall, at his own expense, during the progress of the work or upon its completion, make such tests of his work as are herein specified in accordance with all laws, governing authorities, or as are required by Engineer or by state or municipal bureaus having jurisdiction and under their supervision. The Contractor shall provide all apparatus, temporary piping connections or any other requirements necessary for such tests. He shall take all due precautions to prevent damage to building or its contents incurred by such tests, as he will be required to repair and make good, at his own expense, any damage so caused. Any leaks, defects or deficiencies discovered as a result of the tests shall be immediately repaired or made good and test shall be repeated until the test requirements are full complied with. No caulking of pipe joints to remedy leaks will be permitted.

1.02.2 No work of any nature shall be covered, enclosed or otherwise concealed until properly inspected, tested and approved. Any leaks which develop during any of the tests shall be corrected with new material and made as good as required; said tests shall be repeated until the work is satisfactory to Engineer and the mechanical inspectors in every way.

1.02.3 Each separate system with its various components shall be operated by this Contractor for a reasonable length of time to demonstrate the performance of all equipment and piping in accordance with the true intent and purpose of the plans and specifications. All necessary adjustments shall be made to the satisfaction of the Engineer.

1.02.4 All motor driven equipment shall be proved operable generally in accordance with the intent of these specifications.

1.02.5 All electrical power and water for testing of air conditioning and/or heating equipment and plumbing systems shall be provided by the General Contractor.

#### PART 2 - PRODUCTS

##### 2.01 STERILIZATION MATERIALS:

Domestic water sterilization solutions shall contain not less than 50 parts per million of



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available chlorine. The chlorinating materials shall be either liquid chlorine, conforming to U. S. Army Specification Number 4-1, or calcium hypochlorite or chlorinated lime conforming to the requirements of Federal Specification 0-C-114.

### PART 3 - EXECUTION

#### 3.01 TESTING AND ADJUSTING:

3.01.1 Water Piping System: Water piping systems shall be properly tested to a hydrostatic pressure of one hundred and fifty pounds per square inch gauge (150 psi) for a period of not less than eight hours. During this test period, all leaks in pipe, fittings and accessories, and in the particular piping system which is being tested, shall be stopped and the hydrostatic test shall again be applied. This procedure shall be repeated for an entire eight hour period and no leaks can be found while the system being tested is subject to the pressure mentioned above.

3.01.2 Sanitary and Storm Drains: Pipe shall have all outlets temporarily plugged. The pipes shall be filled with water testing the system in sections such that no section shall be tested with less than 10 foot (10') head of water. If after twenty-four (24) hours, the level of the water has been lowered by leakage, the leaks must be found and stopped by this Contractor, and the water level shall again be raised and the test repeated until after twenty-four hour retention period there shall be no perceptible lowering of the water level of the system being tested.

#### 3.02 STERILIZATION:

3.02.1 After completion of the testing, the entire domestic cold and hot water piping systems with attached equipment shall be thoroughly sterilized with a solution containing not less than 50 parts per million of available chlorine as described above. The chlorinating materials shall be pumped into the system through the connection described below. The sterilization solution shall be allowed to remain in the system for a period of eight (8) hours, during which time all valves and faucets shall be opened and closed several times. After sterilization, the solution shall be flushed from the system with clean water until the residual chlorine content is not greater than 0.2 parts per million. The exact procedure actually used shall meet or exceed local code requirements.

3.02.2 The sterilization solution shall be introduced into the water system through a 3/4" opening to be provided in the water main on the house side of the water meter.

3.02.3 The sterilization process shall be conducted under the direction of the local health department and upon completion of the process, the health department shall test and verify the cleanliness of the water piping system.

**END OF SECTION**

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### SECTIONS 15865 -15880

## SECTION 15865 – AIR AND OIL REELS

### PART 1 - GENERAL

#### 1.1 Scope:

- A. Related Work Specified Elsewhere:
  - 1. Coordinate work of this Section with General Requirements in Division 1.
  - 2. Compressed air system components (Section 15880)
  - 3. Oil supply pumps (Section 15870)

### PART 2 - PRODUCTS

- A. LOW PRESSURE HOSE REELS: Quality standard model D8850-OLP as manufactured by Reelcraft Industries, Inc. of Columbia City, Indiana. Hose I.D. 1/2", hose O.D. .844", 50' length as scheduled on drawings. For air and water only. Approved equal by Aro Corp. or Lincoln.
- B. MEDIUM PRESSURE HOSE REELS: Quality standard model D8850-OMP as manufactured by Reelcraft Industries, Inc. of Columbia City, Indiana. Hose I.D. 1/2", hose O.D. .815", 50' length as scheduled on drawings. For oil only. Approved equal by Aro Corp. or Lincoln.

### PART 3 - INSTALLATION

- A. Installation shall be by skilled workmen and shall be in strict accordance with manufacturer's standards.
- B. Guarantee of parts and workmanship for a period of not less than one year.

## SECTION 15870 - OIL SUPPLY PUMPS

### PART 1 - GENERAL

#### 1.1 Scope:

- A. Related Work Specified Elsewhere:
  - 1. Coordinate work of this Section with General Requirements in Division 1.

### PART 2 - PRODUCTS

- 2.1
  - A. 30 weight oils supply pump ARO Model #662008\_E 55 gallon, 3" air motor, 2 1/4 stroke.
  - B. 90 weight oil supply pump ARO Model #612117-D 16 gallon, 3" air motor, 2 1/4 stroke.
  - C. Hydraulic fluid supply pump ARO Model #612117-D 16 gallon, 3" air motor, 2 1/4 stroke.

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stroke.

### 2.2 ACCESSORIES:

- A. Provide couplers, quick connectors, air hoses, material hoses, barrel covers and all other items required for a complete system.
- B. Provide a cut-off valve at each supply pump and at each tubing connection to each reel.
- C. Provide one model #128241-300 combination air filter/regulator/lubricator at each supply pump.

2.3 Accepted equals to ARO Products are Grover and Lincoln, subject to Owner's approval.

## PART 3 - INSTALLATION

- A. Installation shall be by skilled workmen and shall be in strict accordance with manufacturer's standards.
- B. Guarantee of parts and workmanship for a period of not less than one year.

## SECTION 15875 - AUTOMOTIVE OIL CONTROL HANDLES

### PART 1 - GENERAL

#### 1.1 Scope:

- A. Related Work Specified Elsewhere:
  - 1. Coordinate work of this Section with General Requirement in Division 1.

### PART 2 - PRODUCTS

- 2.1
  - A. 30 weight oil control handle, ARO Model #635383, one quart metered control nozzle.
  - B. 90 weight oil control handle, ARO Model #635381, one pint metered control nozzle.
  - C. Hydraulic fluid control handle, ARO Model #635392 with built-in swivel, filter and right angle tip.

#### 2.2 Accessories:

- A. Provide quick connects at each control handle location.

2.3 Accepted equals are Grover and Lincoln, subject to Engineer's approval.

## PART 3 - INSTALLATION

- A. Installation shall be by skilled workmen and shall be in strict accordance with

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manufacturer's standards.

Guarantee of parts and workmanship for a period of not less than one year.

## SECTION 15880 - COMPRESSED AIR SYSTEM COMPONENTS

### PART 1 - GENERAL

#### 1.1 Scope:

- A. Related Work Specified Elsewhere:
  - 1. Coordinate work of this Section with General Requirements of Division 1.
  - 2. Pipe and Pipe Fittings (Compressed Air) (Section 15045)
  - 3. Oil supply pumps (Section 15870)

### PART 2 - PRODUCTS

- A. Air compressor to be provided by the Owner. Mechanical contractor is responsible for installation and piping to his equipment.
- B. Air compressors to be set on vibration isolator pads to be approved by Owner.
- C. Between air compressor and main air line there shall be a braided flex hose. This hose shall be at least the same size as the main air line and shall be designed to accept at least 200 psi in pressure.

### PART 3 - INSTALLATION

- A. Installation shall be by skilled workmen and shall be in strict accordance with manufacturer's standards.
- B. Guarantee of parts and workmanship for a period of not less than one year.

**END OF SECTION**

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## SECTION 15B- MECHANICAL

### SECTION 15500 - GENERAL PROVISIONS

#### PART 1 - GENERAL

##### 1.01 SCOPE:

The scope of the mechanical phase of this project shall include all labor, materials, equipment, etc., required to fulfill the intent of the Contract Documents and shall include the work specified under the subsequent sections of Division 15B of these specifications.

##### 1.02 RELATED DOCUMENTS:

All applicable provisions of General Conditions, Supplement to General Conditions and General Requirements, Division 1 govern work under this Division. Refer to these articles in the specifications for additional information.

##### 1.03 REFERENCE STANDARDS:

1.03.1 All work shall be performed in full accord with the latest editions of the applicable state and national building codes.

1.03.2 Refer to each section for applicable codes and reference standards.

##### 1.04 FEES, PERMITS AND TAXES:

This Contractor shall give all notices, obtain and pay for all permits required by local authorities.

##### 1.05 SUBMITTALS:

1.05.1 The symbol "<S>" indicates a requirement for submittals.

1.05.2 Refer to General Conditions of the contract.

1.05.3 In addition to the requirements of the above referenced portions of this specification, all Subcontractors proposing to do work under this Division shall comply with the following additional requirements:

A. These specifications and drawings are intended to indicate a standard of quality for materials and equipment which is established by the listing of manufacturers' names and catalog numbers and/or by referenced standards. Materials and equipment that do not comply with these standards of quality will not be considered for substitution.

B. As soon as practicable and within twenty (20) days after the award of the contract and

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before beginning the fabrication of any material or the installation of any equipment, data shall be submitted for approval on equipment and materials where noted. Materials (pipe, fittings, etc.) may be listed with the name of the manufacturer and identifying catalogue numbers. Data for equipment shall include manufacturer's name, catalogue data, diagrams, drawings and other descriptive data as required or requested by the Engineer for evaluation.

C. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalogue number, such references shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product material, fixture, form or type of construction which in the judgment of the Engineer expressed in writing, is equal to that specified.

D. All data shall be carefully examined and shall be forwarded for approval with a signed certification to the effect that the data has been carefully checked and found to be correct with respect to dimensions and available space and that the equipment complies with all requirements of the specifications.

E. Point out in writing all deviations between the plans and specifications and the materials submitted.

F. It is understood that proof of equality is the responsibility of the Contractor and/or supplier and that it is not the responsibility of the Engineer to prove the inequality of the proposed substitutions. Furthermore the decisions of the Engineer is final.

1.05.5 While it is not the intention of the Engineer to discriminate against any manufacturer of equipment which is equal to specified equipment, a strict interpretation of such equality will be exercised by the Engineer in considering any equipment offered as a substitute for equipment named in the specification. It shall be the responsibility of the Contractor to submit with each request for approval of substitute material or equipment, sufficient data to show conclusively that it is equal to the material or equipment specified.

1.05.6 Each Contractor shall submit shop drawings and/or diagrams for approval and for job coordination in all cases where significant deviations from the contract drawings are contemplated because of job conditions, interferences, or substitutions of equipment, or when requested by the Engineer for purposes of clarification of the Contractor's intent. He shall also submit detailed shop drawings, rough-in sheets, etc., for all special or custom built items of equipment.

1.05.7 Submittal of shop drawings shall be made in sufficient copies to provide one (1) copy of all data to be retained by the Engineer; two (2) copies of all data to be accumulated for the Owner; one (1) copy of all data to be retained by the Contractor.

1.05.8 Should any substitute items be submitted and disapproved, then those items must be furnished exactly as described herein.

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1.05.9 The Engineer's review of shop drawings and/or submittal data shall not relieve the Contractor of responsibility for deviations from the contract drawings or specifications.

1.05.10 The size of mechanical equipment shown on the drawings is based on the dimensions of a particular manufacturer. While other manufacturers may be acceptable, it is the responsibility of the Contractor to determine if the equipment he proposes to furnish will fit in the space. Shop drawings shall be prepared when required by the Engineer or Owner to indicated a suitable arrangement.

1.05.11 One quarter (1/4) inch scale reproducible shop drawings shall be prepared and submitted for approval to indicate a suitable arrangement in all mechanical rooms, to include but not limited to piping, fittings and valves, equipment and accessories. All ductwork shall be drawn double-lined. All drafting shall be done by a qualified draftsman. The engineer reserves the right to request resumes of drafting personnel or drafting service.

1.05.12 All provisions of this section shall comply with General Statute 133-3, revised and ratified July 13, 1993.

### 1.06 OPERATING AND MAINTENANCE MANUALS AND INSTRUCTIONS:

1.06.1 The symbol "<OM>" indicates a requirement for operating and maintenance manuals to be furnished.

1.06.2 The Owner's operating personnel shall be instructed by the Contractor on how to start and operate each item of equipment. Safety features shall be pointed out, particularly the possible troubles which might cause the safety controls to operate and what might be done to remedy the trouble.

1.06.3 The Owner's operating personnel shall be thoroughly instructed in the operation of the control system. Instructions should include an explanation of the control system or system sequence of operation, the proper set points of each thermostat, etc., and how to change the settings to accommodate overheating and overcooling, or incorrect humidity. Instructions shall include an explanation of components which should not be tampered with or control settings which should not be changed except by authorized personnel of the Control Manufacturer. Thermostat keys shall be turned over to the Owner.

1.06.4 Relative to the mechanical system, instruct the Owner's operating personnel in the following:

- A. Removal of service access panels from equipment. If special tools are required, turn over to the Owner at least one set.
- B. Method of removing air filters.
- C. Method of cleaning permanent type filters.

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- D. Location of concealed valves, traps, air splitters, automatic valves and dampers, etc., requiring periodic maintenance and location of access to them.
- 1.06.5 Provide (4) four copies of operating and maintenance manuals. Manuals shall be bound in large ring, loose-leaf binders and contain the following:
- A. Manufacturer's instructions and/or installation manual.
  - B. Manufacturer's service manual.
  - C. Manufacturer's lubrication chart listing types of lubricant to be used on each item of equipment and recommended frequency of lubrication.
  - D. Electrical diagrams of each equipment "packaged" control system.
  - E. Diagrams of automatic temperature control systems, identifying each by name, location and number showing sequence of operation. Each component of a control system shall be identified. All diagrams shall be up-to-date, reflecting any on-the-job changes.
  - F. Parts lists and identifying part numbers with prices of each part. The name and address of the nearest distributor from which parts can be obtained.

### 1.07 WARRANTY

This contractor shall warrant all workmanship, material, equipment systems, etc., provided by him for a period of one year after final acceptance of the project. This warranty means that this contractor shall make good to the Owner, at no cost, any defects that become apparent during the year following substantial completion. This warranty is in addition to any other guarantees or warranties and is not intended to limit such other guarantees or warranties.

1.08 DEFINITIONS: The following words and phrases as used herein are hereby defined:

1.08.1 "provide": Furnish and install all material and labor required for a complete installation ready for operation in accordance with the intent of the Contract Documents.

1.08.2 "as required": Indicates that the Contractor shall perform the work or provide the material as indicated in accordance with manufacturer's installation instructions; and in accordance with applicable codes or regulations; and in a workmanlike manner as defined by good local practice.

1.08.3 "or equal": Indicates that the Contractor may substitute equipment by another manufacturer if the salient features of the equipment indicated by manufacturer's name and/or described are, in the judgment of the Architect and/or Engineer, adequate. Submittals for approval are required where indicated.

1.08.4 "contractor": Where the word(s) "Contractor" or "this Contractor" is/are used, that refer to the Contractor engaged to execute the work under this division of the specifications only, even though he may be technically described as a sub-contractor.



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1.08.5 "intent of the Contract Documents": The specific intent of these documents is to provide to the Owner, in a thoroughly functional condition, all the various systems, equipment, etc., indicated herein. Final authority over interpretation of the "intent" shall rest with the Architect.

1.08.6 "shall": Indicates a mandatory requirement.

### 1.09 INSPECTION OF THE SITE:

1.09.1 The drawings are prepared from the best information available and reflect all conditions commensurate with this information. However, the contractor should visit the site prior to submitting a proposal and should verify the locations, sizes, depths, pressures, etc., of all existing utilities, equipment and structural members and familiarize himself with working conditions, hazards, existing grades, soil conditions, obstructions, etc. If it becomes evident that existing site conditions will impair the proper operation of the utilities or proposed HVAC systems, the Architect/Engineer should be notified in writing.

1.09.2 All proposals shall take these existing conditions and any revisions required into consideration.

1.09.3 The removal of existing ceilings for Mechanical Work is the responsibility of the Mechanical Contractor unless it is specifically stated otherwise elsewhere in these specifications. The Mechanical Contractor shall include in his bid (when the above is applicable) the amount to hire a Ceiling Contractor to remove, safely store (if lay-in) and replace the ceiling upon completion of the Mechanical Work. The Ceiling Contractor shall be licensed, insured and has been in the business of ceiling installation for at least five (5) years. Refer also to the architectural demolition plans.

1.09.4 The cutting and patching of floors and walls for Mechanical Work is the responsibility of Mechanical Contractor unless it is specifically stated otherwise elsewhere in these specifications. The Mechanical Contractor shall include in his bid (when the above is applicable) the amount to hire a Contractor regularly engaged in the repair and finish of such surfaces, including any masonry, painting, tile, hardwood or carpet replacement, to restore damaged areas to match existing adjacent surfaces. The Contractor hired shall be licensed, insured and has been in business for at least five (5) years. Refer also to the architectural demolition plans.

1.09.5 Roofing work shall be the responsibility of the General Contractor. The Mechanical Contractor shall furnish all roof curbs, equipment rails and pipe supports to the General Contractor for installation.

### 1.10 CONSTRUCTION REQUIREMENTS:

1.10.1 The Contractor shall be responsible for fitting his material and apparatus into the

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building and shall carefully lay out his work at the site to conform to the structural conditions, to provide proper grading of lines, to avoid all obstructions and to conform to the details of the installation supplied by the manufacturer of the equipment to be installed. Furnish all necessary pilot lines and control lines whether indicated on the drawings or not.

The drawings do not give exact details as to elevations of pipe lines nor do they show exact locations of pipe to scale. Piping elevations shall be handled by giving precedence to pipes which require a stated grade for proper operation. Devices necessary for installation and support of pipes, and equipment (such as sleeves, inserts, etc.) shall be located and installed as the construction progresses in order to allow completion of each phase of the work in the proper sequence.

1.10.2 Drawings showing the extent and arrangement of the work of a particular trade shall be used together with drawings showing extent and arrangement of work of other trades to insure that the Contractor in laying out and installing his work shall do so in a manner such that the work of the several trades may progress in the most direct, workmanlike and harmonious manner.

1.10.3 The Contractor shall be responsible for the proper location and size of slots, holes or openings in the building structure pertaining to his work, and for the correct location of pipe sleeves. The drawings indicate the extent and general arrangement of the various systems, but if any departures from these drawings are deemed necessary by the contractor, detailed drawings and descriptions of these departures and a statement of the reasons therefore shall be submitted to the Architect as soon as practicable. No departures from the arrangements shown on the drawings shall be made without prior written approval of Architect.

1.10.4 In general, piping and ductwork in finished areas of the building shall be run concealed unless noted and directed otherwise. Should any conditions arise which would cause any piping or ductwork to be exposed in finished areas, it shall be immediately called to the Architects' attention. In unfinished spaces such as equipment rooms, all pipe and duct shall be run as high as possible, shall be run to a continuous grade and shall be grouped wherever it is feasible to do so.

1.10.5 Equipment shall be installed in such a manner to make oiling devices and parts requiring service and maintenance readily accessible.

1.10.6 All pipe, duct, etc., shall be cut accurately to measurements established at the building and shall be worked into place without springing or forcing. All ducts and pipes run exposed in machinery and equipment rooms shall be installed parallel to the building planes except that the lines shall be sloped to obtain the proper pitch. Piping and ducts run above furred ceilings, etc., shall be similarly installed, except as otherwise shown. All pipe openings shall be kept closed during construction until the systems are closed with final connections.

1.10.7 All trades shall thoroughly acquaint themselves with the details before submitting their bid as no allowance will be made because of unfamiliarity with these details. For new

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construction, place all inserts to accommodate the ultimate installation of pipe hangers in the forms before concrete is poured and set sleeves in forms before construction. For existing construction, all required inserts shall be "drilled-in" and all openings required through concrete or masonry shall be "saw-cut" or "core drilled" with tools specifically designed for this purpose. Explosive or compression driven inserts shall only be allowed for use as approved by SMACNA and the manufacturer of these devices. All concealed lines shall be installed as required by the pace of the job to precede the general construction.

1.10.8 The mechanical plans do not give exact locations of outlets, fixtures, equipment items, etc. The exact location of each item shall be determined by reference to the general plans and to all detail drawings, equipment drawings, roughing-in drawings, etc., by measurements at the building and in cooperation with other trades. Minor relocations necessitated by the conditions at the site or directed by the Owner shall be made without additional cost to the Owner.

1.10.9 All oiling devices and all parts of equipment requiring adjustment shall be easily accessible. Equipment shall be so located and installed as to permit convenient and safe maintenance and future replacement. The trade furnishing the equipment shall be responsible prior to ordering same in the event that equipment specified and/or approved is incompatible with this requirement.

### 1.11 SLEEVES:

1.11.1 Refer to General Conditions of the contract.

1.11.2 Each and every pipe and duct, regardless of material, which passes through a concrete slab, (except slab on grade), masonry wall, roof or other portion of the building structure shall be free from the structure and shall pass through a sleeve furnished and installed by the Subcontractor responsible for the work involved.

1.11.3 Above grade and dry location sleeves shall be constructed from schedule 40 steel pipe and shall be flush on both sides of wall surface penetrated. The sleeves shall be sized to allow free passage of the pipe to be inserted, and when this pipe is to be insulated, the sleeves shall be large enough to pass the insulation. Floor sleeves located in pipe chases shall extend up two inches (2") above the floor slab.

1.11.4 Sleeves passing through walls or floors on or below grade and/or in moist areas shall be constructed of galvanized steel, schedule 40 pipe and shall be designed with suitable flange in the center of the floor or wall to form a waterproof passage. After the pipes have been installed in the sleeves, void space around the pipe shall be caulked to insure a waterproof penetration. Fire ratings of rated walls and floors shall be maintained by the use of approved materials.

### 1.12 ISOLATION

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1.12.1 Transmission of perceptible vibration, structure-borne noise, or objectional air borne noise to occupied areas by equipment installed under this contract will not be permitted.

1.12.2 The isolation supplier shall be a firm or individual capable of dealing effectively with vibration and noise characteristics, effects and criteria and have facilities and capabilities for measuring and evaluating such disturbances and the preparation of drawings and installation instructions.

### 1.13 CONSTRUCTION SAFETY:

This contractor assumes all responsibility regarding the safety of his personnel on the project during construction. The Contract Documents do not include materials, procedures, components, etc., required to insure construction safety. Refer to General Conditions and Supplementary General Conditions for additional information.

### 1.14 DAMAGE:

1.14.1 This Contractor shall be responsible for damage to project caused by this Contractor's failure to recognize hazards associated with items such as leaks, scheduling of work, inexperienced workmen, excessive cutting, etc.

1.14.2 This Contractor shall repair, at no expense to the Owner, any such damage.

1.14.3 This contractor shall familiarize himself with working conditions to the extent that he shall be responsible for damage to concealed piping, wiring and other equipment to remain and shall repair any damage caused by his negligence at no cost to the Owner.

### 1.15 FLOOR, CEILING AND WALL PLATES:

1.15.1 Refer to General Conditions of the contract.

1.15.2 In addition to the requirements of the above referenced portions of this specification, all Subcontractors shall furnish a chromium plated sectional escutcheon in each finished space on each pipe or hanger rod penetrating a wall, floor or ceiling. Escutcheons shall be sized to fit snugly to all lines and where the lines are insulated, the escutcheons shall be fit snugly over the insulation. Where required, these plates shall be provided with set screws so that they fit snugly against the finished surface. All equipment rooms are classified as finished space.

### 1.16 IDENTIFICATION:

1.16.1 Each piece of equipment; every valve whose service and/or duty is not readily apparent; each zone duct, outside air duct and return air duct whose duty is not immediately apparent; every piping system except cast iron sewer lines, shall be permanently and clearly identified.

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1.16.2 Equipment, valves and duct shall be provided with laminated phenolic nameplates, appropriately engraved with proper identification correlated to the designation shown on the drawings. Do not use self-adhesive nameplates to equipment with brass screws. Punched plastic tape will not be acceptable. Insulated equipment may have identification taped on as for piping system.

1.16.3 Piping systems shall have designation on twenty foot (20'-0") centers and closer where required to provide adequate identification, using Brady "all temperature permacode" pipe markers with direction of flow and service indication. Piping systems in mechanical rooms shall be painted and stenciled identifying the system. Color scheme shall be as follows:

Gas Pipe      - Yellow

1.16.4 All these pipe markers shall conform to ANSI-A-13 "Scheme for the Identification of Piping Systems". Arrow markers must have the same ANSI background colors as their companion pipe markers. All marks shall be as manufactured by Brady or approved equal.

1.16.5 Contractor shall obtain written approval of proposed identification scheme prior to application.

1.16.6 In lieu of a small phenolic tag, a plastic or clear tape label, or simple color dot sticker placed on ceiling grid at approximate location of the device shall be acceptable. Selected marking scheme shall accompany a schedule or legend which copy shall be included in O&M manual or/and posted in mechanical room. Abbreviations and color coding shall be per ANSI/ASME A13.1 as applicable.

### 1.17 SAFETY GUARDS:

Contractor shall furnish and install all safety guards required. All belt driven equipment, projecting shafts and other rotating parts shall be enclosed or adequately guarded.

### 1.18 STORAGE OF MATERIALS:

Each contractor shall provide space for storage of materials, equipment or tools at ground level. Any storage contemplated within the building will be allowed only upon specific approval of the Architect.

### 1.19 MANUFACTURERS' DIRECTIONS:

The manufacturers' published directions shall be followed in the delivery, storage, protection, installation, piping and wiring of all equipment and material. The Contractor shall promptly notify the Architect in writing of any conflict between the requirements of the contract documents and the manufacturers' directions and shall obtain the Architect's instructions before proceeding with the work. Any such work performed that does not comply with the manufacturers' directions shall have deficiencies corrected at no cost to the Owner.

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### PART 2 - PRODUCTS

#### 2.01 MATERIALS:

All materials shall be new and free from defects at the time of installation. Materials or equipment damaged in shipment or otherwise damaged prior to installation shall not be repaired at the job site, but shall be replaced with new materials.

#### 2.02 MANUFACTURER'S REQUIREMENTS:

When a manufacturer's name appears in these specifications, it is not to be construed that the manufacturer does not have to meet the full requirements of the specifications or that his standard cataloged item will be acceptable.

#### 2.03 SERVICE AND REPAIR PARTS:

All equipment installed on this project shall have local representation, local factory authorized service, and a local stock of repair parts.

#### 2.04 FLAME SPREAD PROPERTIES OF MATERIALS:

All materials and adhesives used for air conditioning filters, acoustical lining, and insulation shall conform to NFPA and UL life, safety and flame spread properties of materials. The composite classifications shall not exceed 25 for a flame spread rating and 50 for a smoke developed rating for these classifications as listed for the basic materials. The finishes, adhesives, etc., specified for each system shall be such when completely assembled.

#### 2.05 ACCESS PANELS:

Provide flush mounted metal access panels and frames with concealed hinges and key actuated locks for all concealed and otherwise inaccessible valves, parts, fittings, fire dampers, equipment, filters, etc. and as required for inspection or service.

### PART 3 - EXECUTION

#### 3.01 WORKMANSHIP:

3.01.1 All work shall be done by experienced craftsmen skilled in the applicable trade.

3.01.2 Sloppy work shall be rejected and corrected at no additional expense.

#### 3.02 PROTECTION OF EQUIPMENT:

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The Contractor shall continuously maintain adequate protection of stored materials and installed equipment. Fixtures and equipment, located inside or outside shall be protected against dirt, rust, moisture and abuse from other trades. Materials and equipment shall not be stored directly on the ground. Ductwork, piping and equipment shall not be used by other trades as supports for scaffolds for personnel. At the completion of the work, equipment, fixtures, exposed supports and piping shall be vacuumed free of loose dirt and cleaned to the satisfaction of the Architect. Repairs made necessary by damage shall be paid for by the Contractor.

### 3.03 PROTECTION OF STRUCTURE:

Each Contractor in performing his work shall take particular care not to damage the structure. All finished floors and step treads shall be covered to prevent any damage by workmen or their tools and equipment during the construction of the building. In addition, each Contractor shall protect any materials on the job site whether a part of this contract or the property of another Contractor.

### 3.04 LARGE EQUIPMENT:

All large pieces of equipment which will be installed in the building, and which are too large to permit access through doorways, stairways or shafts, shall be brought to the job by the Contractor and placed in the spaces before the enclosing structure is closed in.

### 3.05 FOUNDATIONS:

3.05.1 Concrete foundations required by mechanical equipment shall be constructed by this Contractor. See Concrete Work.

3.05.2 Equipment shall be set in place on the bases, leveled and aligned by means of shims, piped, then grouted in, in that order. After grouting, the forms shall be removed and the surfaces of the foundation shall be hand-rubbed with carborundum. Concrete work shall conform to the requirements of General Specifications, Concrete Work, of this specification.

### 3.06 CONFLICTS, INTERFERENCES AND COORDINATION BETWEEN TRADES:

3.06.1 The drawings are not to be construed as shop drawings, but indicate the extent, general location, arrangement, etc., of piping systems and equipment. This Contractor shall refer to other sections of the specifications and other drawings such as electrical, structural, architectural, etc., in order to eliminate conflicts and undue delays in the progress of the work. Where other Contractors furnish items requiring piping connections by this Contractor, they will be held responsible for providing roughing-in drawings and assistance upon request.

3.06.2 Each trade shall so harmonize its work with that of the other trades so that the work

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may be done in the most direct and workmanlike manner without hindering the other trades. Piping interference shall be handled by giving precedence to pipe lines which require a stated grade for proper operation. Where space requirements conflict, the following order of precedence shall be observed:

- A. Building lines
- B. Structural members
- C. Soil and drain piping
- D. Vent piping
- E. Refrigerant piping
- F. Condensate piping
- G. Supply ductwork
- H. Exhaust ductwork
- I. Domestic water
- J. Electrical conduit
- K. Natural gas piping

3.06.3 In the event of conflicts between specifications and drawings, drawings shall take precedence over specifications except in matters pertaining to quality, applications, and coordination between trades, which shall be governed by specifications.

3.06.4 In the event of conflict between codes, as interpreted by the authority having jurisdiction and the contract documents, the codes shall govern.

3.06.5 In the event of conflict between manufacturer's installation instructions and the drawings, the manufacturer's installation instructions shall govern.

### 3.07 CUTTING AND PATCHING:

3.07.1 All cutting required by the installation of sleeves, piping, equipment, etc., shall be performed by this Contractor. Patching shall be by this Contractor. This Contractor shall not cut any structural element or any finished work without permission from the Engineer.

3.07.2 This Contractor shall cut and patch all paving as required by the installation of buried piping, including utilities.



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3.07.3 Refer to paragraph 1.09 of these specifications.

### 3.08 PAINTING:

3.09.1 All painting including "touch-up" shall be provided by the Mechanical Contractor unless noted otherwise. All exposed piping, equipment, etc., shall be clean and free from rust or grease before painting takes place. All supporting steel shall be wire brushed and primed with at least one coat of rust preventative primer.

3.08.2 Where equipment finishes are damaged, this Contractor shall obtain matching color touch-up paint from the equipment's manufacturer and paint as required.

### 3.09 LUBRICATION:

This Contractor shall provide all lubricants for the operation of all equipment until acceptance. The Contractor shall be required to protect all bearings during the installation and shall thoroughly grease steel shafts to prevent corrosion. All motors and other equipment shall be provided with covers as required for proper protection during construction. All equipment bearings requiring periodic lubrication shall be provided with proper fittings for this purpose. Where equipment requiring such lubrication is not readily accessible due to location, copper tubing extensions shall be provided in addition to lubrication fittings.

### 3.10 ELECTRICAL WORK:

3.10.1 Except for such items that are completely wired at their point of manufacture and so delivered and unless specifically noted to the contrary herein, the Mechanical Contractor shall do all power wiring from the disconnect switch or breakers to the equipment requiring power. This includes mounting of all electrical devices furnished under this section (Mechanical) of these specifications. All work shall be performed by a licensed electrician.

3.10.2 Wiring for all automatic controls, temperature control, temperature indication, and interlock wiring will be done by the Mechanical Contractor. The furnishing of all disconnect switches as required for proper operation as shown on the drawings and required by code will be by the Electrical Contractor, except where specifically designated otherwise on the plans. The furnishing of all starters for mechanical equipment will be done under this section (Mechanical) of these specifications, unless specifically scheduled otherwise on a starter schedule on the drawings and shall be installed by the Mechanical Contractor. All control wiring shall be installed in conduit.

3.10.3 Furnishing of complete wiring diagrams showing power wiring and interlock wiring shall be work under the trade supplying the equipment. Diagrams shall be based on approved equipment and shall be complete integral drawings, not a series of

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manufacturer's individual diagrams. After these diagrams have been approved by the Architect/Engineer, copies shall be furnished to the trades involved and they shall be followed in detail.

3.10.4 The electrical design and drawings are based on the equipment scheduled and shown on the drawings and should any mechanical equipment requiring changes to the electrical design be approved, the required electrical changes shall be made at the expense of the trade furnishing the changed equipment and at no cost to the Owner.

3.10.5 All work under this division shall be performed in strict accordance with Division 16-Electrical of these specifications and the latest edition of the National Electrical Code.

3.10.6 Smoke detectors shall be furnished by the Electrical Contractor and installed by the Mechanical Contractor. Electrical Contractor shall be responsible for all power wiring and the Mechanical Contractor shall be responsible for all control wiring.

### 3.11 EQUIPMENT CONNECTION:

This Contractor shall bring required services to equipment items furnished under other sections of this specification or by the Owner, make final connections, and leave equipment ready for operation. Where it is necessary for Contractors performing work covered by this section to make final connections to items of equipment being furnished by Contractors under other sections, all such work shall be performed in a neat and workmanlike manner and all materials shall be of quality and finish normally used for such installation.

### 3.12 OPERATION PRIOR TO COMPLETION:

When any piece of mechanical or electrical equipment is operable and it is to the advantage of the Contractor to operate the equipment, he may do so providing that he properly cleans the equipment, installs clean filter media, properly adjusts and completes all punch list items before final acceptance by the Owner. The date of acceptance and the start of the warranty may not be the same date.

### 3.13 EQUIPMENT AND ARRANGEMENTS:

All equipment shall be installed in a manner to permit access to all surfaces requiring access. All valves, motors, drives, lubrication devices, filters and other necessary items shall be installed in a position to allow removal for service without disassembly of another part.

### 3.14 EXECUTION OF WORK:

The Contractor shall plan, schedule and execute his work and that of any of his Sub-contractors so as not to interfere with the work of other trades or Contractors in the building or on the premises.

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### **3.15 FLASHING AND WATERPROOFING:**

All building penetrations to outside shall be flashed and counter flashed as required to eliminate leaks.

### **3.16 TESTS:**

All tests shall be made by this Contractor and repeated until approved by the Engineer. Piping systems shall not be covered or otherwise concealed until tests have been made and approvals obtained. Notify the Engineer four days prior to tests to allow for scheduling. Test the piping systems as indicated in applicable articles.

### **3.17 CLEAN-UP:**

3.17.1 It shall be the responsibility of each trade to cooperate fully with the other trades on the job to help keep the job site in a clean and safe condition. At the end of each day's work, each trade shall properly store all of his tools, equipment, any surplus materials and all debris caused by his portion of the work.

3.17.2 When all work has been finally tested, the Contractor shall clean all work installed by him, including all fixtures, equipment, pipes, ducts and all exposed work. All pipes shall be flushed out and left free of all obstructions. All plates, grilles, and other finished products shall be thoroughly cleaned and polished.

### **3.18 FINAL INSPECTIONS:**

3.18.1 It shall be the duty of the Contractor to make a careful inspection trip of the entire project, assuring himself that the work on the project is ready for final acceptance, before calling upon the Engineer to make a final inspection.

3.18.2 In order not to delay final acceptance of the work, the Contractor shall have all necessary bonds, guarantees, receipts, affidavits, etc., called for in the various articles of this specification, prepared and signed in advance, and together with a letter of transmittal listing each paper included, and shall deliver the same to the Engineer at or before the time of the final inspections. The Contractor is cautioned to check over each bond, receipt, etc., before preparing same for submission to see that the items check with the requirements of the specification.

### **3.19 DEMOLITION AND SALVAGE:**

3.19.1 Where demolition of equipment or materials is required this Contractor shall minimize cutting and exercise all due caution to leave undamaged surfaces, material and equipment meant to remain.

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3.19.2 All existing items that are to be removed shall remain the property of the Owner unless declared as unsalvageable. Unsalvageable materials shall become the property of the Contractor and be removed from the site. Items declared as Owner's property shall be neatly stored on the site as directed by the Owner.

**END OF SECTION**

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## SECTION 15550 - EQUIPMENT

### PART 1 - GENERAL

#### 1.01 GENERAL:

Refer to Section 15500 for General Requirements for Mechanical Work.

#### 1.02 SCOPE OF WORK:

Furnish and install all labor, materials, equipment, tools and services and perform all operations required in connection with, or properly incidental to, the construction of complete air conditioning equipment systems as indicated on the drawings, reasonably implied therefrom or as specified herein unless specifically excluded.

#### 1.03 SCHEDULES ON DRAWINGS:

In general, all capacities of equipment and motor and starter characteristics are shown on schedules on the drawings. Reference shall be made to the schedules for such information. The capacities shown are minimum capacities. Variations in the characteristics will be permitted only on written approval of the Engineer. Insofar as is possible, all items of the same type (i.e., pumps, fans, etc.) shall be by the same manufacturer. Where instructions on installation are not included on these specifications or on the plans, the manufacturer's instructions shall be followed.

#### 1.04 EQUIPMENT INSTALLATION AND WARRANTY SCHEDULE:

This Contractor shall refer to the architectural specifications for the required time schedule for the installation of equipment furnished as a part of this contract. The required time schedule will necessitate the setting-in-place of some items before the normal period of occupancy of the space and before the acceptance of substantial completion and subsequent approval by the Owner and Engineer. The Contractor is advised that the warranty for each item of equipment will not begin until after final acceptance of the building as defined in the architectural specifications, and the Subcontractor will, therefore, make the necessary arrangements with the equipment manufacturers for extended warranties as may be required.

#### 1.05 REFERENCE STANDARDS:

ASHRAE Handbook – Equipment (Latest Edition)  
ASHRAE Handbook - Fundamentals (Latest Edition)  
ASHRAE Handbook - HVAC Systems & Applications (Latest Edition)  
North Carolina State Building Code - Latest Edition  
Standard For Installation of Air-Conditioning & Ventilating Systems - NFPA 90A  
Standard Mechanical Code - SBCCI  
Reference SECTION 15500 for additional information

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## PART 2 - PRODUCTS

### 2.01 FILTERS:

2.01.1 To protect the equipment during construction and for the purpose of testing and balancing, this Contractor shall furnish and install a complete set of temporary filters. These temporary filters shall be of glass fiber in heavy cardboard frame with suitable retainers to hold the media in place.

### 2.02 EXHAUST FANS: <S> <OM>

#### 2.02.1 MODELS SP-A

Ceiling mounted exhaust fans shall be of the centrifugal direct drive type. The fan housing shall be constructed of heavy gauge galvanized steel. The housing interior shall be lined with 0.5 in acoustical insulation. The outlet duct collar shall include an aluminum backdraft damper and shall be adaptable for horizontal or vertical discharge. The grille for sizes 50-390 shall be constructed of high impact polystyrene and for sizes 410-1550, the grille shall be constructed of aluminum. Grilles shall be non-yellowing. The access for wiring shall be external. The motor disconnect shall be internal and of the plug in type. The motor shall be mounted on vibration isolators. The fan wheel(s) shall be of the forward curved centrifugal type, constructed of galvanized steel and dynamically balanced.

#### 2.02.2 MODELS SBE

Belt driven, axial type sidewall fans shall provide as follows:

Propellers shall be constructed with fabricated steel or fabricated aluminum. Propellers shall be securely attached to fan shafts. All propellers shall be statically and dynamically balanced. Motors shall be permanently lubricated, heavy duty type, carefully matched to the fan load and furnished at the specified voltage, phase, and enclosure. Ground and polished steel fan shafts shall be mounted in permanently lubricated, sealed ball bearing pillow blocks. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speeds. Drives shall be sized for a minimum of 150 percent of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to wheel and motor shafts. Motor sheaves shall be adjustable for system balancing. Drive frame and panel assemblies shall be galvanized steel or painted steel. Drive frames shall be formed channels and fan panels shall have prepunched mounting holes, formed flanges, and a deep formed inlet venturi. Drive frames and panels shall be bolted construction or welded construction (level 3 fans only).

The axial exhaust fans shall bear the AMCA Certified Ratings Seals for both sound and air performance.

#### 2.02.3 MODELS GB

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Model GB Roof exhaust fans shall be centrifugal belt driven type. The fan wheel shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced. The fan housing shall be constructed of heavy gauge aluminum with a rigid internal support structure. The fan shroud shall have a rolled bead for added strength. Galvanized rigid wire protects the fan's discharge from birds or small objects.

Motors shall be heavy duty ball bearing type, carefully matched to the fan load, and furnished at the specified voltage, phase and enclosure. Motors and drives shall be mounted on vibration isolators, out of the airstream. Fresh air for motor cooling shall be drawn into the motor compartment from an area free of discharge contaminants. Motors shall be readily accessible for maintenance.

Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speed. Drives shall be sized for a minimum of 150 percent of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts. Motor pulleys shall be adjustable for final system balancing.

A disconnect switch shall be factory installed and wired from the fan motor to a junction box installed within the motor compartment.

A fan conduit chase shall be provided through the curb cap to the motor compartment for ease of installation.

Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.

2.02.4 Fans shall be AMCA air and sound licensed.

Acceptable Manufacturers: Greenheck, Loren Cook or PennBerry.

### **2.03 MOTOR STARTERS: <S> <OM>**

Part 1 Products

1.01 Section Includes:

- A. Enclosed FVNR combination motor starters with electronic overload relay

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### 1.02 References

The starters referenced in this section are designed and manufactured to the following standards unless otherwise noted:

- A. ANSI/NFPA -70, National Electric Code
- B. UL 508, and UL508A Industrial Control Equipment
- C. NEMA ICS-2, 2000
- D. IEC 60947-5, 60947-4, 60947-3

### 1.03 System Description

- A. Combination Starters: Provide Combination Magnetic Starters for all motors 1 HP and above. Refer to Section 1.03.3 for combination magnetic starter requirements.

#### 1.03.1 Enclosed Full Voltage Non-Reversing (FVNR) Non-Combination Three Phase Starter

- A. Magnetic Motor Starters shall be enclosed in a general purpose electrical enclosure with the appropriate environmental rating.
- B. Starters shall consist of a horsepower rated magnetic contactor with a minimum of 1NO and 1NC auxiliary contacts and solid state electronic overload relay. Overload relay shall protect all three phases with a wide range current setting and trip class to allow field adjustment for specific motor FLA. Interchangeable heater elements are not acceptable. Overload relay shall provide phase failure, phase loss, locked rotor and stall protection.
- C. Provide a manual reset pushbutton on the starter cover to restore normal operation after a trip or fault condition.
- D. Must provide over/under voltage and phase monitoring capability. Monitor shall be field adjustable for both over and under voltage levels and a delay time before returning to normal operation after a trip.
- E. Each starter shall include an installed 50VA control power transformer (CPT) with protected secondary. The CPT must accept the available line voltage and the control voltage shall not exceed 120V.
- F. Installed accessories shall include Hand-Off-Auto operation switch with 22mm style operator interfaces. Include LED pilot light indicators for Hand, Off, Auto, Run and Overload conditions. All pilot devices shall be water tight and dust tight.



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- G. Starter must measure and display output current on the front cover. If necessary, install digital or analog ammeter.
- H. When remotely controlled by an automation system, the starter shall include remote run terminals which accept both a voltage input signal and a contact closure. The voltage run input shall accept both AC and DC signals including 24VAC, 120VAC, 24VDC and 48VDC to allow direct connection of the transistorized automation signal to the starter.
- I. In applications where the motor is interlocked with a damper or valve, the actuator control must reside within the starter enclosure. The starter must provide a voltage output to operate the actuator to open the damper or valve without closing the motor circuit. The starter will only close the motor circuit and start the motor after it has received a contact closure from a limit or end switch confirming the damper or valve position.
- J. The starter shall provide a provision for Fireman's Override operation. When activated, the starter run the motor in any mode (Hand, Off or Auto) regardless of other inputs or lack of inputs either manual or auto. The purpose of the Fireman's Override input is to act as a smoke purge function. Fireman's Override has priority over the Emergency Shutdown input.
- K. If the starter is controlled by a fire alarm or life safety system, the starter shall include an Emergency Shutdown input which will disable the starter from operating in either Hand or Auto mode regardless of other inputs either manual or auto.
- L. The starter shall provide the capability to monitor and calculate power consumption (kWh) of the motor load. Each starter shall display the calculated kWh and provide either a pulse output or 4-20mA analog signal to the automation system to monitor the power consumption.
- M. Manufacturer shall provide and install tags with engraved white lettering to designate equipment served

### 1.03.2 Enclosed Full Voltage Non-Reversing (FVNR) Combination Three Phase Starter

- A. Enclosed combination starters shall include all of the magnetic starter requirements in addition to a disconnecting method. Acceptable disconnects include: motor circuit protectors, UL 489 circuit breakers, or a fused disconnects. All disconnects shall include a lock-out mechanism when in the off position.
- B. The Motor Circuit protector shall be a UL listed 508 current limiting manual motor starter with magnetic trip elements only. The breaker shall carry a

## LINCOLN TON EQUIPMENT SHOP

UL 508F rating (up to 100A frame size) which provides for coordinated short circuit rating for use with the motor contactor and provides a minimum interrupting rating of 30,000 AIC for the combination starter.

- C. Fused disconnect shall be UL 98 suitable for service entrance protection. It shall accommodate time delay J-style fuses.
- D. UL 489 breaker shall include thermal and magnetic trip mechanisms.

### 1.04 Quality Assurance

- A. Manufacturer shall provide a five year warranty on the complete starter assembly.
- B. The starter assembly shall be UL listed under UL 508A.

### 2.01 Submittals

Manufacturer shall provide copies of the following documents:

- A. Product data sheets on specified products.
- B. Shop drawings for specified product.
- C. Wiring Schematics for specified products.

Acceptable Manufacturers: Cerus Industries, Square D, Cutler Hammer.

### **2.04 WALL LOUVERS: <S>**

Provide 6" thick stationary extruded aluminum louvers where shown. Units shall exactly fit opening and be flashed completely weather tight.

Louver shall have drainable blades.

**Maximum free area velocity for intake louvers shall not exceed 1201 ft. per minute with a maximum pressure drop of 0.24 inches wg and no more than 0.01 oz. water penetration at 1201 FPM.**

Louver blades shall be a minimum 0.081 inches thick and rigidly bracketed for 20 pounds per square foot wind loading. Frame shall be minimum 0.125" thick.

See Schedule on the drawings for accessories.

Louvers shall be manufactured by Pottorff, Ruskin, Greenheck, United Eneritech.

## LINCOLN TON EQUIPMENT SHOP

### 2.05 GAS FIRED INFRARED HEATERS: <S> <OM>

Gas-fired infrared space heaters shall be furnished and installed in accordance with governing codes and as shown per building drawing(s) as described below:

Heaters shall be SPACE-RAY LTS series tube heaters, model number(s) as manufactured by Gas-Fired Products, Inc., Charlotte, North Carolina or approved equal. Heaters shall be equipped with a 24-volt direct spark ignition with automatic 100% shutoff system. Power supplied to each heater shall be 120 VAC, 60 Hz. The heater controls shall include a pressure switch designed to provide complete unit shutoff in the event of combustion air or flue blockage. The heaters shall be equipped with an on-line diagnosis monitoring light system. The three lights shall monitor the power to the heater, insufficient airflow and the spark ignition and combination gas valve operation.

The heater's burner shall consist of a heavy-duty cast iron atmospheric burner. The flame characteristics shall be highly luminous for maximum radiant heat transfer through the emitter tube wall.

The heater's emitter tube shall operate at an average surface temperature of 700°F - 800°F and shall be made of 16-gauge calorized aluminized steel or calorized titanium alloy Alumi-Therm steel for long life (4" O.D.). The emitter tube shall be calorized for longevity, corrosion resistance, and high radiant efficiency. The measured surface emissivity shall be 0.83 - 0.86 at operating temperature. The calorization process shall produce an emitter tube that is highly radiant absorptive (0.95) on the interior and highly radiant emissive (0.83-0.86) on the exterior. The system shall have a radiant efficiency (or radiant coefficient) of 58%.

To assure a high degree of safety and increased radiant efficiency, the heaters shall operate under negative pressure at all times during operation to preclude the escape of combustion gases inside the building. The heater exhaust assembly shall include a 120-volt draft inducer. The draft inducer shall be equipped with a permanently lubricated, totally enclosed and shielded, fan cooled, and heavy-duty ball bearing motor. The motor shall not require maintenance or lubrication for the life of the unit. The draft inducer assembly shall be capable of rotating 90° for vertical or horizontal venting.

The heaters will be CSA design certified for vertical or horizontal venting, maximum 75 feet horizontal sidewall venting, and for 50 feet outside combustion air inlet duct. There shall be no draft hoods. The combustion chamber shall be totally enclosed.

The heaters shall utilize factory assembled, highly efficient aluminum reflectors with a reflectivity of 97.5%. The reflector ends shall be enclosed for maximum radiant heat output and minimum convection losses.

The heaters shall be factory assembled and tested. The heaters shall not require any field adjustments to assure maximum performance and safety.

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Heaters shall operate satisfactorily in any position from horizontal to forty-five degrees (45°) from horizontal, and incline mounted up to 2/12 pitch, and shall be suitable for vented/indirect vented applications. Heaters shall be designed to operate on natural or propane gas.

Heaters shall be design certified by the Canadian Standards Association (CSA) to American National Standard Z83.20/CSA 2.34. The manufacturer shall provide a written limited warranty covering the heavy one-piece cast iron burner for a period of ten (10) years, the emitter tube for a period of five (5) years and all components utilized in the heater's control assembly for a period of one (1) year.

Acceptable Manufacturers: Space-Ray, Roberts Gordon, Superior Radiant and Swank.

### **2.06 GAS FIRED FURNACE: <S> <OM>**

#### **NATURAL GAS MODELS**

Central Heating furnace designs are certified to ANSI Z21.47 / CSA 2.3 for both natural and L.P. gas. Limit setting and rating data were established and approved under standard rating conditions using American National Standards Institute standards.

#### **SAFE OPERATION**

The Integrated System Control has solid state devices, which continuously monitor for presence of flame, when the system is in the heating mode of operation. Dual solenoid combination gas valve and regulator provide extra safety.

#### **QUICK HEATING**

Durable, cycle tested, heavy gauge **aluminized steel heat exchanger** quickly transfers heat to provide warm conditioned air to the structure. **Low energy power vent blower**, to increase efficiency and provide a positive discharge of gas fumes to the outside.

#### **BURNERS**

Multiport Inshot burners will give years of quiet and efficient service. All models can be converted to **L.P. gas** without changing burners.

#### **INTEGRATED SYSTEM CONTROL**

Exclusively designed operational program provides total control of furnace limit sensors, blowers, gas valve, flame control and includes self diagnostics for ease of service. Also contains connection points for E.A.C./humidifier.

#### **AIR DELIVERY**

The four speed, direct drive blower motor, has sufficient airflow for most heating and cooling requirements, will switch from heating to cooling speeds on demand from room thermostat. The blower door safety switch will prevent or terminate furnace operation when the blower door is removed.

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### STYLING

**Heavy gauge steel and “wrap-around” cabinet construction** is used in the cabinet with baked-on enamel finish for strength and beauty. The heat exchanger section of the cabinet is completely lined with foil faced fiberglass insulation. This results in quiet and efficient operation due to the excellent acoustical and insulating qualities of fiberglass. Built-in bottom pan and alternate bottom, left or right side return air connection provision.

### FEATURES AND GENERAL OPERATION

The XR 95 High Efficiency Gas Furnaces employ a Silicon Nitride Hot Surface Ignition system, which eliminates the waste of a constant burning pilot. The integrated system control lights the main burners upon a demand for heat from the room thermostat. Complete front service access.

- a. Low energy power venter
- b. Vent proving pressure switch.

### XR 95 Standard Equipment

- Power supply 115/1/60
- Convertible to horizontal
- **Type 29-4C™** stainless steel secondary heat exchanger
- Inner blower doors
- Direct drive, 4-speed motors
- Silicon Nitride igniter with adaptive heat up
- Accessory hook-up capability – Hum and EAC
- Quiet induced draft blower
- Blower door safety switch
- Dual solenoid combination gas valve & regulator
- PVC venting – 1 or 2 pipe vent option
- Left/right gas connection
- Selectable cooling fan off delay eliminates need for BAY24X045 time delay relay
- Single wire twinning
- Integrated solid state control with self diagnostics
- 24 volt fuse
- Manual reset burner box limit

Acceptable Manufacturers: Trane, Lennox, Johnson Controls.

## 2.07 SPLIT SYSTEM CONDENSING UNIT – COOLING ONLY: <S> <OM>

### General

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The 4TTA3 shall be fully charged from the factory for matched indoor section and up to 15 feet of piping. This unit must be designed to operate at outdoor ambient temperatures as high as 115°F. Cooling capacities shall be matched with a wide selection of air handlers and furnace coils that are ARI certified. The unit is certified to UL 1995 application.

### **Casing**

Unit casing is constructed of heavy gauge, galvanized steel and painted with a weather-resistant powder paint. Corrosion and weatherproof CMBP-G30 DuraTuff™ base.

### **Refrigerant Controls**

Refrigeration system controls include condenser fan and compressor contactor. High and low pressure controls are inherent to the compressor. Another standard feature is the liquid line dryer.

### **Compressor**

The Climatuff® compressor features internal over temperature and pressure protector, total dipped hermetic motor and thermostatically controlled sump heater. Other features include: roto lock suction and discharge refrigeration connections, centrifugal oil pump, and low vibration and noise.

### **Condenser Coil**

The Spine Fin™ coil shall be continuously wrapped, corrosion resistant all aluminum with minimum brazed joints. This coil is 5/16 inch O.D. seamless aluminum glued to a continuous aluminum fin. Coils are lab tested to withstand 2,000 pounds of pressure per square inch. The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on all four sides by louvered panels.

### **Low Ambient Cooling**

As manufactured, this unit has a cooling capability to 55°F. The addition of an evaporator defrost control permits operation to 30°F. The addition of a low ambient kit permits low ambient cooling to 0°F.

Acceptable Manufacturers: Trane, Lennox, Johnson Controls.

## **2.08 VEHICLE EXHAUST SYSTEM: <S> <OM>**

Fan

### **GENERAL DESCRIPTION:**

The UNICO Series Overhead Inlet features a powder welded and powder coated angle iron frame capable of supporting a direct drive blower as well as a single or dual inlet. The UNICO system may be used with 3", 4", 5" & 6"Ø flexible tube. The standard UNICO system comes equipped with an angle iron frame, flexible tube, clamps, CTA clamping tailpipe adapter, balancer, flexible tube connection, and flange set. The

## LINCOLN TON EQUIPMENT SHOP

UNICO may also be equipped with a direct drive blower as well as a dual inlet connection so that two flexible tubes may be used. This arrangement also requires a second balancer for the additional flexible tube drop.

### **TECHNICAL CHARACTERISTICS:**

Frame Material: 2" x 2" x 1/8" angle iron (powder coated)  
BB-4 Balancer: 15-pound capacity, locking type

### **FLEXIBLE TUBING OPTIONS:**

Series XT-65: For high temperature applications, constructed of two-ply, triple overlap thermoplastic impregnated polyester with an enclosed steel helix. See NSGV Page No. 2006-53

### **EXHAUST HOSE:**

#### **GENERAL DESCRIPTION:**

The NSGV Series **XT-65** is extremely flexible, light weight and can be utilized in high temperature applications up to +650° F continuous and +850° F intermittent. Maximized durability is achieved by a two-ply, triple overlap thermoplastic polyester fabric construction. The tubing will be reinforced with a 12-gauge spring steel wire helix that is enclosed in the making of the tube. The cloth shall have a .028 Mil thickness and be National Blue in color with an OSHA Yellow wear strip. The wear strip serves as a protective measure against scratching of vehicles.

#### **TECHNICAL CHARACTERISTICS:**

Temperature rating: -20°F to +650°F continuous / +850°F intermittent  
Retardant Abilities: Listed as UL 94 V-O flame retardant  
Compression Ratio: 4:1  
Pitch: 2"  
Standard Length: 25'-0" and 50'-0"  
Diameter Range: 2" thru 16"  
Color: National Blue with OSHA Yellow wear strip

Acceptable Manufacturers: National System of Garage Ventilation (NSGV), Nederman, and DSP Monoxivent.

### **2.09 GUARANTEE:**

This contractor shall guarantee all materials, equipment and workmanship for one (1) year following final inspection and acceptance of the building by the Architect and the Owner. This applies to all materials and equipment installed under this contract, regardless of the source.

The one (1) year guarantee period will start on the day of final inspection and acceptance of the building by the Architect and the Owner for occupancy by the Owner.

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The contractor shall provide to the Architect a letter with two (2) copies stating the beginning and ending date of the guarantee based on the aforementioned starting dates.

The contractor shall provide to the Owner in writing an additional four (4) year guarantee on all new refrigeration compressor units and heat exchanger.

**END OF SECTION**



# LINCOLNTON EQUIPMENT SHOP

## SECTION 15600 - PIPING SYSTEMS

### PART 1 - GENERAL

#### 1.01 SCOPE:

Work in this section shall include piping, fittings, accessories etc., to be used in piping systems in accordance with the intent of the Contract Documents and shall include the following principal items:

Piping  
Valves  
Piping Accessories

#### 1.02 REFERENCED STANDARDS:

National Bureau of Standards (NBS).  
Cast Iron Soil Pipe Institute (CISPI).  
American Society of Testing & Materials (ASTM).  
American Water Works Association (AWWA).  
National Fire Protection Association (NFPA).  
Factory Mutual Engineering Corporation (FM).  
American Society of Mechanical Engineers (ASME).

#### 1.03 SUBMITTALS:

Submittals are required as indicated only. Submittal of pipe and fittings is not required unless a deviation from the specification is proposed.

### PART 2 - PRODUCTS

#### 2.01 CONDENSATE DRAIN PIPING :

Condensate drain piping for condensing equipment shall be PVC piping sized per manufacturer's installation instructions. Insulate with 1-1/2" fiberglass insulation with ASJ jacket. **Do not use Armaflex in return air plenum.**

#### 2.02 GAS PIPING:

Furnish and install a system of gas piping as shown on the plans. All gas piping within the building shall be run exposed unless specifically shown otherwise. Any gas piping concealed within the building shall be properly vented to the outside.

All gas piping shall be standard weight black steel pipe per ASTM A-120-55. All fittings 2-1/2" and smaller shall be standard weight black malleable iron screwed per ASTM A-197-65. Screw thread joints shall be made with an approved compound & shall comply with

## LINCOLN TON EQUIPMENT SHOP

ANSI Standard for Pipe Threads, B2.1-1968.

Care shall be taken to keep the inside of piping dry and free of dirt, cutting burrs and other foreign substances. All threaded piping shall be reamed smooth after cutting and shall be threaded with true, sharp dies to insure a proper joint make-up.

All equipment connection shall be preceded by a manual stop cock, union and 12" drip leg.

Gas cocks 2" and smaller shall be all iron with brass square head plug; cock larger than 2" shall be lubricated plug cocks, 150 psi wog. Shut-off valves (stop-cocks) shall comply with ANSI Z21.15, ANSI Z21.21 or ANSI B16.33 or ANSI/UL 842.

Unions 2-1/2" and smaller shall be Grinnell 463, or equal, black malleable iron, ground joint, brass to iron seat unions. Unions 3" and larger shall be Crane Company Standard malleable iron gasket type flange unions with proper gasket.

All exposed gas piping whether interior or exterior to the building shall be painted with two coats of rust preventative paint. Gas piping shall be identified at 10'-0" intervals: "Natural Gas - 0.5 PSIG".

All underground piping shall have factory applied covering conforming to Republic "X-TRU-COAT", or General Paint Corporation specification "TMA-2", and shall include the following layers: (1) coat biturine enamel, (1) wrapping of felt and a final wrapping of heavy kraft paper. Fittings and joints shall be treated and wrapped as specified above, in field after lines have been tested.

Underground gas piping shall be Type "K" semi-rigid copper tubing. If approved by local inspector and codes, underground gas piping may be orange polyethylene plastic pipe per ASTM D-2104-74, D-2239-74, and D-2737-74 with fusion joints equal to PPI PE 2306 in lieu of wrapping black steel pipe. M.C. shall size per manufacturer's recommendations.

The gas piping shall be bonded to the structural steel in accordance with section 250.104(B) of the latest edition of the National Electric Code by the Mechanical Contractor.

Gas Piping shall be tested in strict accordance with NFPA 54.

### 2.03 PIPING ACCESSORIES GENERAL:

2.03.1 Flanges shall be slip-on or butt welding standard weight 1/16" raised face type with gaskets.

2.03.2 Unions shall be all bronze for copper systems and malleable iron with ground joint for steel piping systems. Provide dielectric unions for joining dissimilar metallic piping systems.

2.03.3 Weldolets and threadolets shall be steel per ANSI B16.9.

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2.03.4 Escutcheons shall be single piece, set screw type, chrome plated and shall cover the opening and sleeve.

### PART 3 - EXECUTION

#### 3.01 PIPING INSTALLATION:

3.01.1 The piping systems required under the Mechanical division of these specifications shall be installed in a neat and workmanlike manner. All pipe hangers shall be of the type mentioned in this section and shall be so spaced and installed as to maintain a rigid piping system, adequately supported both laterally and vertically.

3.01.2 At each piece of equipment, gate valves or gas cocks shall be furnished and installed by this Contractor so that these groups of pieces of equipment may be isolated from accessible locations. Provide General Contractor with locations of all access doors. Access doors required for these valves shall be furnished by this Contractor.

3.01.3 Each of the piping systems shall be installed to provide for expansion and contraction and the joints shall be soldered or welded at such time that the system is not under strain.

3.01.4 Necessary spring pieces and offsets shall be furnished by this Contractor as required.

3.01.5 Each of the piping systems shall be concealed in chases and above ceilings and in walls in all finished areas and shall be run exposed only as specifically specified or as shown on the drawings in machinery spaces or unfinished areas.

3.01.6 Exposed piping shall be held close to the walls and ceilings and necessary fittings shall be provided and installed to allow for offsets to hold the piping close to wall and ceilings. Where these lines run exposed a clearance shall be obtained from the Architect in writing before making the installation.

3.01.7 All valves shall be so located as to make the removal of their bonnets possible. All flanged valves shown in the horizontal positions shall be mounted with valve stem inclined one bolt hole above the horizontal lines shall be "made-up" with valve stem inclined at an angle of thirty (30) degrees above the horizontal position. All valve stems must be true and straight at the time the system is tested for final acceptance.

3.01.8 Pipe shall be cut accurately to measurements established at the site and worked into place without springing or forcing.

3.01.9 Provide clearance for installation on insulation and for access to valves, air vents, drain and unions.

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3.01.10 Slope piping as indicated and provide manual air vents at high points of system. Extend 1/4" soft copper extensions from vents to suitable drain where manual air vents are in inaccessible locations.

3.01.11 Provide a 1/2" thick foam plastic insulating sleeve-protector on all copper and plastic piping penetrations of concrete slab-on-grade prior to pouring of concrete.

3.01.12 Locate and suspend piping in such a manner so as to minimize transmission of vibration and noise.

3.01.13 All piping penetrations through fire rated ceilings, walls or floors shall be fire stopped using approved materials to maintain the fire rating of the ceiling, wall or floor structure. **NOTE: THIS PROJECT REQUIRES ALL PIPING PENETRATIONS THROUGH CEILINGS, WALLS OR FLOORS BE FIRE STOPPED WHETHER FIRE RATED OR NOT.**

3.01.14 All piping connections to equipment and fixtures shall contain flanges or unions to allow easy removal whether or not shown on the plans.

### 3.02 PIPING JOINTS:

3.02.1 Screwed joints shall have full cut pipe threads. Joints shall be assembled with an approved compound applied to only the male threads. A minimum of three pipe threads shall remain exposed when the joint is assembled.

3.02.2 Solder joints shall be assembled with square cut pipe using a pipe cutter. Hack saw cut pipe ends shall be reamed to full size. Both the pipe and fittings shall be furnished absolutely clean. Brazing flux shall be applied to both the pipe and the fittings. The use of corrosive acid flux will not be permitted. During the brazing, the pipe and fittings must be changed with nitrogen gas.

3.02.3 Welded pipe joints shall be fusion welded by a metallic arc welding process. The welding operations shall conform to the current recommendations of the American Welding Society. This Contractor's welder, employed on this project, shall have passed qualification tests as prescribed by the National Pipe Welding Bureau or other reputable testing laboratory using qualification procedures as recommended by the ASME Boiler Construction Code or American Welding Standards.

### 3.03 SECURING AND SUPPORTING OF PIPE:

3.03.1 All pipe shall be supported from the building structure by means of approved hangers and supports. Piping shall be supported to maintain required grade and pitch, prevent vibration and provide for expansion/contraction.

3.03.2 All hangers shall be secured to approved inserts wherever possible and practicable. Hanger inserts shall be set in place before concrete is poured. Where hangers attach to

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the structural steel framing, approved beam clamps shall be employed. Where required, the Mechanical Subcontractor shall install channels to span between framing members. In no case shall spacing of hangers be greater than indicated on the following schedule:

### FERROUS (SCHEDULE 40) PIPING

<u>NOMINAL PIPE SIZE</u> <u>(MAXIMUM)</u>	<u>HANGER SPACE</u>
1/2"	5'-0"
3/4"	6'-0"
1"	7'-0"
1-1/2"	8'-0"
2" to 2-1/2"	10'-0"
3" to 3-1/3"	12'-0"
4" to 6"	14'-0"

### COPPER (CONDENSATE) PIPING

<u>NOMINAL PIPE SIZE</u> <u>(MAXIMUM)</u>	<u>HANGER SPACE</u>
Up to 3/4"	6'-0"
1" to 1-1/2"	8'-0"
1-1/2" to 2"	10'-0"
Larger than 2"	12'-0"

3.03.3 Vertical lines shall be adequately supported at their bases, either by a suitable hanger placed in the horizontal line near the riser, or by a base fitting set on a pedestal or foundation and from each floor slab by means of approved clamp type support bearing on the slab or beam.

3.03.4 Hangers for piping 2" and smaller shall be of the split cast ring type with fastening device. Hangers for piping larger than 2" shall be of the adjustable clevis hanger type. Hanger rods shall be minimum 3/8" diameter and shall have machine threads. Brackets of approved type may be used along walls. Hanger rods for individually suspended horizontal pipes shall be steel rods of size indicated on the following table:

<u>NOMINAL PIPE SIZE</u> <u>(MAXIMUM)</u>	<u>ROD SIZE</u>
1/2" to 2"	3/8"
2-1/2" to 3"	1/2"
4"	5/8"
5" to 6"	3/4"
8" to 12"	7/8"

3.03.5 Hangers for use with copper piping shall be copper plated ferrous sizes for copper tubing.

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3.03.6 Hangers shall be installed within 2'-0" of each change in direction, either vertical or horizontal, or pipe tee and on each side of valves, strainers, etc.

3.03.7 Multiple horizontal pipes, smaller than 12" diameter pipe, may be supported on trapeze hangers. Trapeze spacing shall be in accordance with the schedule for pipe spacing based upon the smallest pipe. The trapeze members shall be properly sized for the piping load they are to support.

3.03.8 Where "cold" pipes are insulated with a vapor sealing jacket, the hanger shall be oversized accordingly to accommodate the outside diameter of the insulation, and half-round 16 gauge galvanized steel shields, not less than 14" long, rolled to fit the insulation diameter, shall be provided between the insulation and the hanger.

3.03.9 Pipe supports shall be as manufactured by Fee and Mason, Grinnell, F&S Manufacturing, or Michigan Hanger.

**END OF SECTION**

# LINCOLNTON EQUIPMENT SHOP

## SECTION 15650 - SHEET METAL WORK AND ACCESSORIES

### PART 1 - GENERAL

#### 1.01 GENERAL:

1.01.1 Where any reference to "sheet metal work" or "ductwork" appears in this section of these specifications or on the drawings, it shall be construed to include exhaust ducts, relief ducts, plenums, casings for air handling units, duct taps, grille taps and diffuser connections and all other related pieces and parts of the air conveying systems.

1.01.2 Before starting shop drawings or fabrication of any ductwork, the Contractor must have an approved reflected ceiling plan with which he can coordinate location of air outlets, lights, tile patterns, etc.

#### 1.02 SCOPE OF WORK:

Furnish and install all labor, materials, equipment, tools and services and perform all operations required in connection with or properly incidental to the construction of complete Ductwork and Accessories System as indicated on the drawings, reasonably implied therefrom or as specified herein unless specifically excluded.

#### 1.03 SHOP DRAWINGS:

Shop drawings shall be submitted on all items of sheet metal work only as specified hereinafter.

#### 1.04 REFERENCE STANDARDS: (LATEST EDITION)

ASHRAE - Guide and Data Books.  
SMACNA - HVAC Duct System Design  
NFPA - 90A, 90B, 91, 96, 204  
SMACNA - HVAC Duct Construction Standards

### PART 2 - PRODUCTS

#### 2.01 MATERIAL:

All sheet metal duct, plenum and casing construction, unless otherwise specified herein, shall be constructed of new, prime grade, continuous hot dip mill galvanized, lock forming quality steel sheets, per ASTM A 525-75 and shall have a galvanized coating of 1-1/4 ounces total for both sides of 1 sq. ft. of a sheet, in accordance W/G90 per ASTM 525 and ASTM 90. Construction shall be in strict accordance with the construction details and installation details in the referenced SMACNA and NFPA standards as specified.

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### 2.02 LABELING AND GAUGE:

Each sheet shall be stenciled with manufacturer's name and gauge. If coil steel is used, coils shall be stenciled throughout on ten foot (10') centers with manufacturer's name and gauge. Sheet metal must conform to the tolerances listed in SMACNA HVAC Duct Construction Standards.

### 2.03 LOW PRESSURE DUCTWORK CONSTRUCTION:

2.03.1 Rectangular low pressure ducts shall be constructed and reinforced in accordance with "Rectangular Duct Reinforcement" of SMACNA HVAC Duct Construction Standards and NFPA 90A and 90B.

2.03.2 Round low pressure ducts shall be constructed in accordance with Table 3-2 and 3-3 "Round Duct Gauge Selection" and Figure 3-2 "Transverse Joints-Round Duct" of SMACNA HVAC Duct Construction Standards and NFPA 90A and 90B.

Elbows shall be smooth elbows; 5 piece 90 degree elbows or 3 piece 45 degree elbows all with centerline radius 1-1/2 times the duct diameter.

2.03.3 <S> Low pressure flexible ducts shall be in accordance with SMACNA HVAC Duct Construction Standards, NFPA 90A and 90B. Flexible duct shall be equal to Genflex Type IL-1, with couplings and end connections as required for proper installation and compatibility with ductwork system in which they are installed.

- A. All flexible ducts shall have positive interior air seal permanently bounded to a zinc coated high carbon spring steel helix all sheathed in a Class 1 vapor barrier factory sealed at both ends. The composite assembly including vapor barrier shall meet the Class 1 requirements of NFPA for use in a return air plenum, and be labeled by Underwriters Laboratories, Inc. 181 with a flame spread rating of 25 or less and a smoke developed rating of 50 or under.
- B. Low pressure flexible duct shall be rated to 1 1/2" w.g. working pressure.
- C. Flexible duct taps into low pressure plenums or main ducts shall be made with factory fabricated 45° side take-off and rigid round duct with damper, Young or equal bearings, Young or equal operators, and raised bead for tight, positive flex duct connection. Use insulation guard for internally lined ductwork.
- D. Maximum lengths of flexible ducts shall be 15'-0".

2.03.4 **Important Note:** Supply ductwork designed to operate at static pressures from 1/4 to 2 In. W.G., inclusive, shall be sealed in accordance with SMACNA Seal Class C. The term "sealed" means to use mastic or mastic plus tape or gasketing as appropriate. Unlisted pressure sensitive tape **shall not** be used as the primary sealant.



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### 2.04 DUCT SUPPORTS:

2.04.1 All horizontal and vertical ducts shall be supported in accordance with SMACNA HVAC Duct Construction Standards.

2.04.2 Flexible ducts shall be free of sags and kinks and supported on minimum of 36" centers with 3/4" wide flat banding material. Perforated strap will not be acceptable.

### 2.05 DUCT LINER:

Deleted from this project.

### 2.06 AIR DISTRIBUTION DEVICES:

2.06.1 Grilles, registers and ceiling outlets shall be as scheduled in the plans and shall be provided with sponge rubber or soft felt gaskets. If a manufacturer other than the one scheduled is used, the sizes shown on the drawings shall be checked for performance, noise level, face velocity, throw, pressure drop etc., before the submittal is made. Selections shall meet the manufacturer's own published data for the above performance criteria. The throw shall be such that the velocity at the end of the throw in the five foot occupancy zone will not be more than 50 FPM or less than 25 FPM. Should grilles other than those scheduled by name be furnished, manufacturer shall be prepared to demonstrate compliance with noise criteria on request to Architect's satisfaction. All devices shall be tested per Air Diffuser Council and labeled as such.

Acceptable Manufacturers: Price, Titus, Metalaire, Krueger.

2.06.2 Each air distribution device shall be provided with a 3" thick, 3/4 lb density insulation blanket for condensation control.

2.06.3 Locations of outlets on drawings are approximate and shall be coordinated with other trades to make symmetrical patterns and shall be governed by the established pattern of the lighting fixtures or Architectural reflected ceiling plan. Where called for on the schedules, the grilles, registers and ceiling outlets shall be provided with deflecting devices and manual dampers. These shall be the standard product of the manufacturer, subject to review by the Engineer and equal to brand scheduled. All ceiling devices shall be furnished to be compatible with the type ceiling in which they are installed.

2.06.4 Air distribution devices shall be as manufactured by Titus, Price, Metalaire and shall be as scheduled on the drawings.

### 2.07 INSTRUMENT PORTS:

Instrument ports shall be a 2 5/8" diameter base, neoprene gasket 2" deep neck, screwed cover operated with No. 024 spanner wrench, mounting screws, equal to Young 1101.

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### 2.08 DUCT ACCESS DOORS:

Duct access doors shall be gasketed frame with wing nut fasteners, (1" thick insulation bonded to interior face), 8" x 8" size (duct opening) on ductwork up to 14" and 12" x 12" size on larger ductwork, equal to Young 1310. Access doors shall be provided at all fire dampers and smoke detectors in addition to other places specified in these specifications.

### PART 3 - EXECUTION

#### 3.01 WORKMANSHIP, QUALITY AND REQUIREMENTS:

3.01.1 Ductwork shown on the drawings, specified or required for the heating, ventilating and air conditioning systems shall be constructed and erected in a first class workmanlike manner in accordance with SMACNA recommendations for low pressure and medium pressure duct construction. This work shall be warranted for a period of one year from the date of acceptance of the job against noise, chatter, whistling or vibrations and free from pulsation under all conditions of operation. After the system is in operation, should these defects occur, they shall either be removed and replaced or reinforced as directed by the Engineer.

3.01.2 Ductwork shall be erected in the general locations shown on the drawings, but must conform to all structural and finish conditions of the building. Before fabricating any ductwork, the Contractor shall check the physical conditions at the job site and shall make all necessary changes in cross sections, offsets, etc., whether they are specifically indicated or not.

3.01.3 Provide manually operated volume control dampers in all branches, splits and taps for proper balancing of air distribution whether indicated on the drawings or not. Dampers to be either single blade or multi-blade as shown in the SMACNA manual as required. They shall have an indicating device with lock to hold damper in position for proper setting.

3.01.4 Damper operators in all unfinished areas shall be Young Series 400 of the exact style, type and size as required. All other operators shall be Young #315 and/or #895 as required. All dampers shall have Young end bearings on the rod at the opposite end from the operator. Where dampers are installed in ducts located above accessible type ceiling, damper operators shall not be extended through the finished ceiling. Damper operators above inaccessible ceilings shall be furnished with extension rods operable through diffuser and grille faces or from remote locations.

3.01.5 All square elbows shall have turning vanes per the SMACNA manual requirements except for any return air jumper ducts noted on drawings.

3.01.6 Furnish and install in the ductwork, hinged access doors to provide access to all dampers, automatic dampers, fusible links, cleaning operations, etc. Where the ducts are insulated, the access doors shall be double skin doors with one inch (1") of insulation in the

## LINCOLN TON EQUIPMENT SHOP

door. Factory fabricated doors as manufactured by Milcor or equal meeting these specifications will be acceptable.

3.01.7 Where ducts connect to fans, including roof exhausters, flexible connections shall be made using "Ventglas" fabric that is fire-resistant, waterproof, mildew-resistant and practically air tight and shall weigh approximately thirty ounces (30 oz.) per square yard. There shall be a minimum of one-half inch (1/2") slack in the connections and a minimum of two and one half inches (2 1/2") distance between the edges of the duct except that there shall also be a minimum of one inch (1") of slack for each inch of static pressure on the fan system.

3.01.8 Furnish and install screens on all ducts, fans, etc., and openings furnished by this Contractor which lead to, or are, outdoors. Screens shall be 16 gauge, one half inch (1/2") mesh in removable galvanized steel frames.

3.01.9 Furnish test openings with covers in each zone duct for taking readings of air velocities or pressures in ducts. See the SMACNA manual for cover construction.

3.01.10 All holes in ducts for damper rods and other necessary devices, shall be either drilled or machine punched, (not pin punched), and shall not be any larger than necessary. All duct openings shall be provided with sheet metal caps if the openings are to be left unconnected for any length of time. In general, sheet metal screws shall not be used in duct construction unless the head (not the point) of the screw is in the airstream. Transformations shall have a ratio of not more than one inch (1") in transformation to every seven inches (7") of length unless specifically shown otherwise on the drawings.

### 3.02 FLASHING:

3.02.1 Where ducts pass through roofs or exterior walls, suitable flashing shall be provided to prevent rain or air current from entering the building. The flashing shall be not less than No. 24 gauge galvanized steel.

3.02.2 Where ducts exposed to view pass through walls, floors or ceilings, furnish and install sheet metal collars to cover the voids around the duct.

**END OF SECTION**

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### SECTION 15750 - TEMPERATURE CONTROLS

#### SEQUENCE OF OPERATION:

##### 1.01 SINGLE ZONE GAS FURNACE

- A. Each unit shall be controlled by a stand-alone 7-day programmable thermostat with night time set back. Occupied Mode - All unit functions will be enabled for normal heating and cooling operation.

Normal Operation - When in occupied mode as described above, the dedicated unit control shall operate stages of heating and cooling to maintain space temperature setpoint. Unit shall cycle heating and cooling as required to maintain space setpoint. Outside air damper shall be manually set for minimum position when unit is energized.

##### 1.02 MISCELLANEOUS SEQUENCE

Toilet exhaust fans shall be controlled by occupancy sensors in grille or by the wall switch.

The infrared gas tube heaters shall be controlled by the line voltage thermostat supplied with the heaters. When the room temperature falls below the thermostat set point, the flue fan will energize, the igniter will energize, and the gas valve will open, ensuring ignition until the temperature rises above the set point. Once the set point is reached, the gas valve will close, the flame will go out, and the flue vent fan will run until cool down of the unit is complete.

The ventilation fans will either run continuously or be controlled by a wall switch.

The vehicle exhaust fans will be controlled by a wall switch.

**END OF SECTION**

## LINCOLN TON EQUIPMENT SHOP

### SECTION 15800 - VIBRATION ISOLATION AND SEISMIC RESTRAINT

#### 1.01 GENERAL

See Appendix B Sheet of the drawings, Structural Design, for Seismic Design Category, Use Group and Spectral Response Acceleration Values.

#### **Important Note:**

**The appendix B on the project drawing cover sheet indicates the seismic design category is "B". Therefore, no seismic restraints are required at all. If the project seismic design category is determined to be "C"; then only the gas piping will be subject to seismic restraint requirements.**

All equipment and piping furnished and installed under this contract shall be seismically restrained as required by Chapter 16, STRUCTURAL DESIGN, in the North Carolina Building Code, 2009 Edition. Specific attention shall be given to Section 1621, ARCHITECTURAL, MECHANICAL AND ELECTRICAL COMPONENT SEISMIC DESIGN REQUIREMENTS. The Mechanical Contractor shall include in his/her bid price the cost to accomplish all requirements of the aforementioned code.

The contractor shall notify the local representative of the seismic restraint materials manufacturer prior to installing any seismic restraint devices. The contractor shall seek the representative's guidance in any installation procedures with which he is unfamiliar.

1. The local representative of the seismic materials manufacturer shall conduct periodic inspections of the installation of the materials herein specified, and shall report in writing to the contractor any deviations from good installation practice observed.
2. Upon completion of the installation of all seismic restraint devices herein specified, the local representative of the seismic materials manufacturer shall inspect the completed system and report in writing any installation errors, improperly selected seismic devices, or other fault in the system which could affect the performance of the system.
3. The installing contractor shall submit a report to the building architect and/or engineer, including the manufacturer's representative's final report, indicating that all seismic restraint material has been properly installed, or steps to be taken by the contractor to properly complete the seismic restraint work as per the specifications.

#### 1.02 QUALITY CONTROL:

1.02.1 All isolation materials, flexible connectors, and seismic restraints shall be of the same manufacturer and shall be selected and certified using published or factory certified data. The isolators and seismic restraint systems shall be manufactured by Amber / Booth.

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Approved equals by Mason Ind.& Vibration Mountings And Controls, who meet all the requirements of the specifications are acceptable.

1.02.2 Manufacturer responsibilities: Manufacturer of vibration and seismic control products shall have the following responsibilities:

1.02.2.1 Provide calculations to determine restraint loads resulting from seismic forces presented in North Carolina Building Code, 2009 Edition, Chapter 16. **Seismic calculations shall be certified by a licensed engineer in the employ of the seismic equipment manufacturer.**

1.02.2.2 Anchor bolt calculations, signed by a qualified licensed engineer, shall be submitted showing adequacy of bolt sizing and type. Calculations shall be furnished for anchors on **restraint devices, cables, and rigidly mounted equipment**. Calculations and restraint device submittal drawing shall specify anchor bolt type, embedment, concrete compressive strength, minimum spacing between anchors and minimum distances of anchors from concrete edges. Concrete anchor locations shall not be near edges, stress joints, or an existing fracture. All bolts shall be ASTM A307 or better.

1.02.3 Steel components shall be cleaned and painted. All nuts, bolts and washers shall be zinc-electroplated. Structural steel bases shall be thoroughly cleaned of welding slag and primed with zinc-chromate or metal etching primer.

1.02.4 All isolator bases and seismic restraints exposed to the weather shall utilize cadmium plated or PVC coated springs and hot dipped galvanized steel components. Nuts, bolts and washers may be zinc-electroplated. Isolators for outdoor mounted equipment shall provide adequate restraint for normal wind loads and withstand a minimum of 30 lb. / sq. Ft. applied to any exposed surface of the equipment.

### 1.03 SUBMITTALS:

The manufacturer of vibration isolation products shall submit the following data for each piece of isolated equipment: clearly identify type of equipment, quantity, and size of vibration isolators and seismic restraints, and rpm of each piece of rotating isolated equipment. Submittals for mountings and hangers incorporating springs shall include spring diameters, rated deflections, and spring free height. Submittals for bases shall clearly identify locations for all mountings, as well as all locations for attachment points of the equipment to the mounting base. Installation instructions shall be included. **Submittals shall include seismic calculations signed and checked by a qualified licensed engineer in the employ of the manufacturer of the vibrations isolators.** Catalog cut sheets shall be included for each type of isolation mounting or seismic restraint used on equipment being isolated.

**END OF SECTION**

# LINCOLN TON EQUIPMENT SHOP

## SECTION 15850 - INSULATION

### PART 1 - GENERAL

#### 1.01. GENERAL:

Refer to Section 15500 for General Requirements for mechanical work.

#### 1.02 SCOPE OF WORK:

The Contractor shall cover all piping and apparatuses, as specified below, with insulation as manufactured by Johns-Manville, Owens-Corning or equal. All insulation, jacket, facing and adhesive shall have composite ratings not exceeding flame spread of 25 and smoke development of 50.

### PART 2 - PRODUCTS:

#### 2.01 DUCTWORK:

All supply, return and outside air ductwork shall be insulated with three quarter pound per cubic foot minimum density glassfiber blanket insulation having type FRK foil reinforced kraft vapor barrier jacket. Insulation shall be 2" thick, 3/4 pound per cubic foot minimum density glassfiber blanket insulation with jacket as specified above with a minimum R value of 5.0. Insulation shall be wrapped tightly on the ductwork with all circumferential joints butted and longitudinal joints overlapped a minimum of 2". Adhere insulation to metal with 4" strips of insulation bonding adhesive at 8" on centers. On longitudinal joints, the overlap shall be secured using 9/16" flared door staples applied 6" on centers and taped with minimum 3" wide foil reinforced kraft tape. All pin penetrations or punctures in facing shall be taped. Tape all circumferential joints with 4" wide foil reinforced kraft tape.

#### 2.02 DUCTWORK EXPOSED TO THE WEATHER:

Duct shall be insulated with 2" thick Dow extruded polystyrene board. All joints shall be taped and sealed. The above specified board shall be covered with 0.020 thick stucco embossed aluminum jacket. The jacket fasteners and hardware shall be stainless steel and all joints shall be sealed with silicon caulking.

#### 2.03 CONDENSATE DRAIN PIPING:

Condensate drain piping from the unit to termination points( floor drains, hub drains) shall be insulated with 3/4" thick armaflex insulation with all joints glued and taped.

#### 2.04 ALUMINUM METAL JACKET:

All insulation outside shall be covered with .016 aluminum jackets secured with aluminum, strapping per manufacturer's installation instructions.

#### 2.05 DUCTWORK EXPOSED IN INTERIOR:

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All exposed ducts in areas including mechanical rooms and storages shall receive rigid fiberglass board insulation with a layer of resin paper over jacket and finish with **fire retardant** 8 oz. canvas, and painted.

### PART 3 - EXECUTION:

#### 3.01 PROCEDURES:

3.01.1 All insulation shall be the product of reputable manufacturers and shall be applied by mechanics skilled in the use of various materials and in the employ of a concern regularly engaged in the insulating business. The materials shall all be applied in accordance with the published standards of the manufacturer of the materials, using any special materials as required by these specifications and by those published standards. Unskilful work shall be just cause for rejection.

3.01.2 All sectional covering shall finish round and smooth, without lumps or depressions and all end and joints shall butt evenly and tightly together and to the covered surface. No broken or damaged section shall be used. When covering is formed from blocks, they shall be carefully and evenly applied, securely wired in place and joints shall be closed with cement insulation.

3.01.3 In instances where insulated lines pass into other areas, wherein the line will not be insulated as described herein, the insulation shall not terminate at the wall, but shall extend full size a minimum of 1" beyond the wall.

3.01.4 Engage the services of a qualified insulation applicator to furnish and install all the insulation required for the mechanical equipment, piping, etc., specified herein.

3.01.5 All surfaces to be insulated shall be clean and dry before applying insulation. All sections of molded pipe covering shall be firmly butted together. No insulation shall be applied until the pipe, duct, etc., have been pressure tested and found tight. Piping flexible connections, flanges and unions shall not be covered unless specifically noted. Flexible connections on ducts shall not be covered.

3.01.6 Prior to the installation of any insulating material to ferrous piping systems, the piping surfaces shall be thoroughly cleaned of all mill scale, grease and dirt and shall be given a coat of rust inhabiting primer.

3.01.7 Where vapor barriers are required, the vapor barrier shall be on the outside. Extreme care shall be taken that the vapor barrier is unbroken. Joints, etc., shall all be sealed. Where insulation with a vapor barrier terminates, it shall be sealed off with the vapor barrier being continuous to the surface being insulated. Ends shall not be left raw.

**END OF SECTION**



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### SECTION 15860 - CLEANING AND TESTING

#### PART 1 - GENERAL:

##### 1.01 GENERAL:

1.01.1 Refer to Section 15500 for General Requirements for Mechanical Work.

##### 1.02 SCOPE OF WORK:

1.02.1 This Contractor shall, at his own expense, during the progress of the work or upon its completion, make such tests of his work as are herein specified in accordance with all laws, governing authorities, or as are required by Engineer or by state or municipal bureaus having jurisdiction and under their supervision. The Contractor shall provide all apparatus, temporary piping connections or any other requirements necessary for such tests. He shall take all due precautions to prevent damage to building or its contents incurred by such tests, as he will be required to repair and make good, at his own expense, any damage so caused. Any leaks, defects or deficiencies discovered as a result of the tests shall be immediately repaired or made good and test shall be repeated until the test requirements are full complied with. No caulking of pipe joints to remedy leaks will be permitted.

1.02.2 No work of any nature shall be covered, enclosed or otherwise concealed until properly inspected, tested and approved. Any leaks which develop during any of the tests shall be corrected with new material and made as good as required; said tests shall be repeated until the work is satisfactory to Engineer and the mechanical inspectors in every way.

1.02.3 Each separate system with its various components shall be operated by this Contractor for a reasonable length of time to demonstrate the performance of all equipment and piping in accordance with the true intent and purpose of the plans and specifications. All necessary adjustments shall be made to the satisfaction of the Architect.

1.02.4 All motor driven equipment shall be proved operable generally in accordance with the intent of these specifications.

1.02.5 All electrical power and water for testing of air conditioning and/or heating equipment shall be provided by the Owner.

#### PART 2 - EXECUTION

2.01.1 Heating, Ventilating and Air Conditioning Systems: Each and every phase of the new air conditioning, heating and ventilating systems shall be operated separately, or in conjunction with the others for a period of time to demonstrate to the satisfaction of the Engineer the ability of the equipment to meet the capacity and performance requirements while maintaining design conditions in accordance with the true intent and purpose of these

## **LINCOLN TON EQUIPMENT SHOP**

specifications. Heating and cooling capacities and performance for every system shall be checked in the winter and summer, respectively. Any adjustments and/or startup required shall be done at no additional cost to the owner. Any adjustments done during one season shall not affect capacities and performance during the other season. The volume of air at each outlet and inlet, air conditioning equipment performance data, etc., shall be tabulated and required balancing performed by engineering personnel skilled, trained and experienced in the performance of these functions. Previous to such performance tests, this Contractor shall have set all valves, dampers, motors, controllers, thermostats, etc., and shall have the system operating and maintaining design temperatures, humidity and air circulation throughout all areas of the building. This Contractor shall also at the proper time make such additional adjustments as may be required to obtain consistent temperatures throughout the project.

**END OF SECTION**

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### SECTION 15870 - SYSTEM BALANCING AND ADJUSTING

#### PART 1 - GENERAL

##### 1.01 GENERAL:

1.01.1 Refer to Section 15500 for General Requirements for Mechanical Work.

1.01.2 The work described in this Section shall be performed by the Contractor.

##### 1.02 SCOPE OF WORK:

1.02.1 This section covers the testing, balancing and adjusting of environmental systems including but not limited to: hydronic distribution systems and the equipment and apparatus connected thereto.

1.02.2 The work required herein shall consist of setting volume (flow) and speed adjusting facilities provided or specified for the system, recording data, making tests and preparing reports, all as hereinafter specified

#### PART 2 - PRODUCTS

NOT APPLICABLE

#### PART 3 - EXECUTION

##### 3.01 PROCEDURES:

3.01.1 Environmental systems including all equipment, apparatus and distribution systems shall be tested and balanced in accordance with the latest edition of NEBB Procedural Standards for Testing - Balancing and Adjusting of Environmental Systems published by NEBB or Associated Air Balance Council (AABC).

3.01.2 Testing and balancing shall be done by an independent testing and balancing firm with at least two (2) years verifiable experience.

3.01.3 Instruments used for measurement shall be accurate and calibration histories for each instrumentation shall be available for examination.

3.01.4 Before receiving final approval, Contractor shall clean out all lines, adjust all valves, control items and other equipment, clean all pipe and equipment, and leave his installation complete and in good working order.

3.01.5 The Contractor shall be responsible for inspecting, adjusting, balancing and logging the data on the performance of fans, all dampers in the duct system, and all air distribution devices.

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3.01.6 Final balancing, so that all areas of the building are at the same approximate temperature at the time of balancing, shall be done immediately after occupancy. Heating and cooling capacities and performance for every system shall be checked in the winter and summer, respectively. Any testing and/or adjusting required shall be done at no additional cost to the owner. Any adjustments done during one season shall not affect capacities and performance during the other season. Re-balance shall be done during the guarantee period as required by the Engineer.

3.01.7 Final adjustments shall be within  $\pm 10\%$  of design values. If this cannot be attained, the Engineer shall be notified in writing with an explanation.

### 3.02 REPORTS:

3.02.1 The final reports shall be submitted for review on forms similar to those suggested by the National Environmental Bureau or the American Air Balance Council. Each individual final reporting form submitted must bear the signature of the person who recorded the data and the signature of the Test-Adjust-Balance Supervisor of the performing firm. Forms shall be typed and submitted in three (3) hole soft back binders.

3.02.2 Identification of all types of instruments used and their last dates of calibration will be submitted with the final report.

3.02.3 Before final acceptance of the system is made, the contractor shall furnish to the Engineer the following data in five (5) copies:

- A. A tabulation of simultaneous temperature (Dry bulb and wet bulb) of all spaces on each separately controlled zone for both the cooling and heating seasons.
- B. A listing of measured air quantities at each outlet.
- C. Air quantities at all return and exhaust devices.
- D. The manufacturer model number and serial number of the rooftop units, recovery units, fans and unit heaters. List name plate full load amps, voltages, phase and actual running load amps, (voltage on each leg if 3 phase), horsepower, number of belts and model number of belts where appropriate, number of filters and filter sizes, burner input and output capacities.

Test and balance reports shall be completed, reviewed, and approved by the designer of record before submitting to SCO for request for Final Inspection and Occupancy Permit. Rough drafts of test and balance reports from the contractor will not be acceptable.

### 3.03 CLOSE OUT CERTIFICATES:

The Mechanical Contractor shall deliver to the Architect/Engineer, prior to or in conjunction with his request for final payment, the original and two (2) copies each of:

## **LINCOLNTON EQUIPMENT SHOP**

Inspection certificates previously herein specified.

Mechanical Contractor's letter of Guarantee.

Equipment manufacturer's warranties for rooftop units, heat recovery units, exhaust fans, etc.

Affidavit of Payment of Debts and Claims (Section 317).

Affidavit of Release of Liens (Section 316).

Consent of Surety to Final Payment (Section 318).

Letter certifying that all materials used on this project do not contain asbestos.

**END OF SECTION**



# LINCOLN TON EQUIPMENT SHOP

## DIVISION 16 - ELECTRICAL

### SECTION 16010 - GENERAL PROVISIONS

#### PART 1 - GENERAL

##### 1.01 SCOPE:

The scope of the electrical phase of this project shall include all labor, materials, equipment, etc., required to fulfill the intent of the Contract Documents and shall include the work specified under the following sections:

SECTION 16050 – BASIC MATERIALS AND METHODS  
SECTION 16400 – SERVICE AND DISTRIBUTION  
SECTION 16450 – GENERATOR MANUAL TRANSFER SWITCH  
SECTION 16500 – LIGHTING  
SECTION 16700 – COMMUNICATIONS

##### 1.02 RELATED DOCUMENTS:

All applicable provisions of Division 0 and 1 govern work under this division. Refer to these articles in the specifications for additional information.

##### 1.03 REFERENCED STANDARDS:

1.03.1 All work shall be performed in accordance with the latest editions of the applicable state, national and local ordinances and building codes and in accordance with the National Electric Code.

1.03.2 Refer to each section for applicable codes and reference standards.

1.03.3 The provisions of the North Carolina Construction Manual shall apply to this project along with the requirements of the following agencies:

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

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1.03.4 See below the THIRD PARTY AGENCIES ACCREDITED BY THE NCBC TO LABEL ELECTRICAL AND MECHANICAL EQUIPMENT. Strict adherence to this list is mandatory.

### THIRD PARTY AGENCIES ACCREDITED BY THE NCBC TO LABEL ELECTRICAL AND MECHANICAL EQUIPMENT AS OF JULY 1, 2006

Applied Research Laboratories  
5371 Northwest 161st Street  
Miami, Florida 33014  
(305) 624-4800

Equipment Categories:  
6, 8, 12, 14, 15, 16, 18,  
21, 22, 24, 31, and 43

CSA International  
178 Rexdale Boulevard,  
Toronto, Ontario, Canada M9W 1R3  
(416) 747-2798

Equipment Categories:  
All

Entela, Inc.  
3033 Madison Avenue SE  
Grand Rapids, Michigan 49548  
(616) 247-0515

Equipment Categories:  
11, 12, 26, 27, 28, 29, 31, 40,  
43, 47 & 48

Factory Mutual Research  
PO Box 9102  
Norwood, Massachusetts 02062  
(781) 762-4300

Equipment Categories:  
4, 5, 9, 17, 19, 24, 28, 31, 32, 39, 43,  
47 - 51

Intertek Testing Services ITS-ETL  
3933 US Route 11  
Cortland, New York 13045-2014  
(607) 753-6711

Equipment Categories:  
All except 21

Intertek Testing Service ITS-Warnock  
3933 US Route 11  
Cortland, New York 13045-2014  
(607) 753-6711

Equipment Categories:  
17, 18, 21, 24 & 25

MET Laboratories  
2200 Gateway Centre Blvd., Suite 215  
Morrisville, NC 27560  
(919) 481-9319

Equipment Categories:  
7, 10, 11, 12, 13, 14, 15, 16, 18,  
22, 23, 26, 27, 28, 29, 30, 31, 37,  
38, 39, 40, 43, 44, 47, 48 and 50



## LINCOLNTON EQUIPMENT SHOP

National Technical Systems (NTS)  
533 Main Street  
Acton, Massachusetts 01720  
(978) 263-2933

Equipment Categories:  
26, 27 & 28

Omni-Test Laboratories  
PO Box 743  
Beaverton, Oregon 97075  
(503) 643-3788

Equipment Categories:  
17, 18 & 21

PFS Corporation  
2402 Daniels Street  
Madison, Wisconsin 53718  
(608) 221-3361

Equipment Categories:  
17, 19, 20, 21 & Replacement  
Blowers & coils

RADCO  
3220 East 59<sup>th</sup> Street  
Long Beach, California 90805  
(310) 272-7231

Equipment Categories:  
17, 18 & Replacement  
Blowers and coils

TUV America  
65 T. W. Alexander Dr.  
RTP, North Carolina 27709  
(800) 888-0123

Equipment Categories:  
4-8, 10-20, 22, 23, 26-29, 31, 35,  
36, 38, 39, 43, 46-48 & 50

TUV Rheinland of North America  
762 Park Avenue  
Youngsville, North Carolina 27596  
(919) 554-3668

Equipment Categories:  
7, 8, 9, 11, 12, 13, 14, 16,  
26, 27, 28, 31, 40, 43, 47 & 48

Underwriters Laboratories, Inc.  
12 Laboratory Drive  
RTP, North Carolina 27709  
(919) 549-1400

Equipment Categories:  
All

Wyle Laboratories  
7800 Highway 20 West  
Huntsville, Alabama 35806  
(256) 837-4411 x 4125

Equipment Categories:  
4, 26 & 43

## LINCOLN TON EQUIPMENT SHOP

### EQUIPMENT CATEGORIES

1. Conductors for General Wiring.
2. Flexible Cords.
3. Wires and Cables for Special Applications.
4. Materials and Components for Special Applications.
5. Alarm Signal and Detecting System Components.
6. CATV and Radio Distribution System Components.
7. Communication System Components.
8. Radio and Television Components.
9. Energy Management System Components and Controllers.
10. Sound Recording and Reproduction Equipment.
11. Fixed Office Appliances and Business Equipment.
12. Electrical Appliances.
13. Electric Space Heating Equipment and Accessories.
14. Air Conditioning Equipment and Accessories.
15. Heat Pump Equipment and Accessories.
16. Refrigerant Equipment and Accessories.
17. Gas Fired Heating Equipment and Accessories.
18. Gas Fired Appliances.
19. Oil Fired Heating Equipment and Accessories.
20. Oil Fired Appliances.
21. Solid Fuel Heating Equipment.
22. Fans and Ventilators.
23. Filtering Equipment.
24. Duct Materials Including Dampers.
25. Chimneys and Vents.
26. Electrical Data Processing Equipment.
27. Medical, Dental, and X-Ray Equipment.
28. Laboratory Equipment, Electrical Measuring, and Testing Equipment.
29. Food Preparation Machines.
30. Swimming Pool and Spa Equipment.
31. Miscellaneous Fixed Equipment - Amusement Machines, Animal Care, Appliances, Battery Chargers, Cleaning Machines, etc.
32. Fire Extinguishing Equipment.
33. Circuit Breakers.
34. Fuses.
35. Wiring Devices, Attachment Plugs and Toggle Switches.
36. Switches and Switching Devices - Other than Toggle.
37. Panelboards.
38. Switchboards.
39. Transformers.
40. Electrical Signs and Accessories.
41. Ground-Fault Circuit Interrupters.
42. Ground-Fault Sensing and Relaying Equipment.

## LINCOLN TON EQUIPMENT SHOP

43. Industrial Control Equipment - Motor Controllers, Industrial Control Panels, Motor Control Centers, Motorized Valves, Solenoids, etc.
44. Transient Voltage Surge Suppressors and Filters.
45. Lightning Protection System Components and Lightning Protection Devices.
46. Metering Enclosures and Meter Sockets.
47. Emergency Lighting and Power Equipment System Components.
48. Lighting Fixtures, Lamp Holders, and Accessories.
49. Auxiliary Gutters, Junction, Pull and Outlet Boxes, and Cabinets and Cutout Boxes.
50. Electrical Equipment for Hazardous Locations.
51. Grounding and Bonding Equipment.
52. Wire Connectors, Lugs, and Terminal Fittings.
53. Insulating Tape and Closures.

### 1.04 FEES, PERMITS AND TAXES:

This Contractor shall make arrangements for and pay for all inspection fees and permits required by the local authorities. The Contractor shall also pay all taxes levied for labor and materials associated with work under this Division. It shall be the electrical contractor's responsibility to notify the Office of Electrical Inspector, Department of Insurance, to schedule all required electrical inspections.

### 1.05 SUBMITTALS:

1.05.1 The symbol "<S>" indicates a requirement for submittals.

1.05.2 Shop drawings, manufacturer's data materials lists, etc., are required for all equipment and material where submittals are required.

1.05.3 Refer to "General Conditions" and/or "Instructions to Bidders" for additional information on submittals.

1.05.4 Submittals shall be presented from published manufacturer's data and in such a form that the Engineer can readily verify compliance with codes, standards, and the Contract Documents including construction features, rough-in requirements, etc. Each submittal shall contain data relevant to the particular equipment (including options). The data shall be identified by "hyphens", arrows, underlining, etc. Do not submit pages of non-relevant information. Broad general data is not acceptable. If equipment submitted is not as specified in the Contract Documents, then the submittal shall contain specific details prominently identifying any differences in form, fit or function. This contractor is responsible for any additional costs arising from any substitution of any item.

### 1.06 OPERATING AND MAINTENANCE MANUALS AND INSTRUCTIONS:

## LINCOLN TON EQUIPMENT SHOP

1.06.1 The symbol "<OM>" indicates that operating and maintenance manuals are to be furnished.

1.06.2 Each operating and maintenance manual shall apply specifically to the equipment installed. In those cases where one manual covers a general class of equipment, the contractor shall be required to identify (hy-liteing, underlining, etc.) those portions which apply to the installed equipment. All operating and maintenance manuals shall be available for inspection by the Architect/Engineer at the final inspection.

1.06.3 Provide (3) three copies of operating and maintenance manuals. Manuals shall be bound in large ring loose-leaf binders and contain the following:

- a. Manufacturer's instructions and/or installation manual.
- b. Additional items that may be required in Division 1.

### 1.07 PRIOR APPROVAL:

Where the contractor wishes to substitute equipment or materials under an "or equal" clause, he shall submit to the Engineer in writing seven (7) calendar days prior to bid opening lists of proposed substitutions which, from published manufacturer's data, cover the salient features of the proposed substitution. Approvals will be issued in writing.

1.08 DEFINITIONS: The following words and phrases are hereby defined:

1.08.1 "provide": Furnish and install all material and labor required for a complete installation ready for operation in accordance with the intent of the Contract Documents.

1.08.2 "as required": Indicates that the contractor shall perform the work or provide the material as indicated in accordance with manufacturer's installation instructions and in accordance with applicable codes or regulations.

1.08.3 "or equal": Indicates that the contractor may substitute equipment by another manufacturer if the salient features of the equipment indicated by manufacturer's name and/or described are, in the judgment of the Architect, adequate. See article PRIOR APPROVAL.

1.08.4 "contractor": Where the word(s) "contractor" or "this contractor" is used herein it refers to the contractor engaged to execute the work under this division of the specifications only, even though he may be technically described as a sub-contractor.

1.08.5 "Intent of the Contract Documents": The specific intent of these documents is to provide to the owner, in a thoroughly functional condition, all the various systems, equipment, etc., indicated herein. Final interpretation of the "intent" shall rest with the Engineer.

## **LINCOLN TON EQUIPMENT SHOP**

1.08.6 "shall": Indicates a mandatory requirement.

### **1.09 INSPECTION OF THE SITE:**

1.09.1 The drawings are prepared from the best information available and reflect all conditions commensurate with this information. However, the contractor should visit the site prior to submitting a proposal and should verify the locations, sizes, depths, pressures, etc., of all existing utilities and familiarize himself with working conditions, hazards, existing grades, soil conditions, obstructions, etc. If it becomes evident that existing site conditions will impair the proper operation of the utilities, the Architect shall be notified in writing.

1.09.2 All proposals shall take these existing conditions and any revisions required into consideration, and the lack of specific site information on the drawings shall not relieve the contractor of any responsibility

### **1.10 CONSTRUCTION SAFETY:**

This Contractor assumes all responsibility for the safety of his personnel on the project during construction. The Contract Documents do not include materials, procedures, components, etc., required to insure construction safety. Refer to General Conditions for additional information.

### **1.11 DAMAGE:**

1.11.1 This Contractor shall be responsible for damage to the project caused by this Contractor's failure to recognize hazards associated with items such as lack of power, scheduling of work (tardiness), inexperienced workmen, excessive cutting, etc.

1.11.2 This Contractor shall repair at no expense to the owner any such damage.

1.11.3 This Contractor shall familiarize himself with working conditions to the extent that he shall be responsible for damage to concealed piping, wiring and other equipment meant to remain, and shall repair any damage caused by his negligence at no cost to the owner.

## **PART 3 - EXECUTION**

### **3.01 WORKMANSHIP:**

3.01.1 All work shall be done by experienced craftsmen skilled in the applicable trade.

3.01.2 Unprofessional and incomplete work shall be rejected and corrected at no additional expense.

### **3.02 MANUFACTURER'S INSTALLATION INSTRUCTIONS:**

3.02.1 All equipment shall be installed in strict compliance with manufacturer's

## LINCOLN TON EQUIPMENT SHOP

installation instructions.

### 3.03 PROTECTION OF EQUIPMENT:

3.03.1 The Contractor shall continuously maintain adequate protection of stored materials and installed equipment. Fixtures and equipment, whether located inside or outside, shall be tightly covered with sheet polyethylene or waterproof tarpaulin as protection against dirt, rust, moisture and abuse from other trades. Adequate air circulation shall be provided under any protective sheet to prevent condensate build up. Materials and equipment shall not be stored directly on the ground.

3.03.2 Ductwork, piping, conduit and equipment shall not be used by other trades as supports for scaffolds or personnel. At the completion of the work, equipment, fixtures, exposed supports and piping shall be cleaned of loose dirt, construction debris, overspray, etc., to the satisfaction of the Engineer. Repairs made necessary by damage shall be paid for by the Contractor.

3.03.3 All equipment and conduit furnished and installed under this contract shall be seismically restrained as required by Chapter 16, STRUCTURAL DESIGN, in the North Carolina State Building Code, 2009 Edition, with specific attention to Section 1613, EARTHQUAKE LOADS. These seismic load provisions are also required in Chapter 13 of the American Society Civil Engineers' publication ASCE 7, 2005 Edition. The Electrical Contractor shall include in his/her bid price the cost to accomplish all requirements of the aforementioned code.

### 3.04 CONFLICTS, INTERFERENCES AND COORDINATION BETWEEN TRADES:

3.04.1 The drawings are not to be construed as shop drawings but indicate the extent, general locations, arrangement, etc., of conduit systems and equipment. If the contractor has any questions regarding the layout of a particular device or equipment item he shall contact the architect for clarification. This Contractor shall, in laying out his work, refer to other sections of the specifications and other drawings such as air conditioning, structural, plumbing, architectural, etc., in order to eliminate conflicts and undue delays in the progress of the work. See article CUTTING AND PATCHING for additional coordination required. Where items are furnished by other trades require connections by this Contractor, they shall be held responsible for providing rough-in drawings and assistance upon request.

3.04.2 All work shall be closely coordinated with other trades. Failure to do so could result in the relocation of installed work of the contractor at fault at his/her own expense.

3.04.3 In the event of interferences, piping or equipment requiring set grades or elevations shall have precedence over conduit, lighting, outlet boxes, air conditioning, ductwork, etc.

## LINCOLNTON EQUIPMENT SHOP

3.04.4 In the event of conflicts between specifications and drawings, specifications shall take precedence over drawings.

3.04.5 In the event of conflict between codes as interpreted by the authority having jurisdiction, and the contract documents, the codes shall govern.

3.04.6 In the event of a conflict between manufacturer's installation instructions and the drawings, the manufacturer's installation instructions shall govern.

3.04.7 In all events, the intent of the Contract Documents shall govern. Minor conflicts and interferences shall, wherever possible, be worked out on the project. Major conflicts shall be referred to the Architect for solution.

3.04.8 Where electrical wiring is required by trades other than covered by Division 16, the installer shall refer to the wiring materials and methods as specified under Division 16, No Exceptions.

### 3.05 CUTTING AND PATCHING:

3.05.1 All cutting required by the installation of sleeves, conduit, equipment, etc., shall be coordinated with the General Contractor, but performed by this Contractor. Patching shall be by General Contractor. This Contractor shall not cut any structural element or any finished work without written permission from the Architect.

3.05.2 This Contractor shall cut and patch all paving/concrete as required by the installation of buried conduit or wire.

### 3.06 PAINTING:

3.06.1 All painting except "touch-up" shall be provided under the painting section (Division 9) unless noted otherwise. All exposed conduit, equipment, etc., shall be left clean and free from rust or grease and ready for the painter.

3.06.2 Where equipment finishes are damaged, this Contractor shall obtain touch-up paint in matching colors from the equipment manufacturer and paint as required.

### 3.07 DIVISION OF WORK:

3.07.1 All individual motor starters and drives for mechanical equipment (fans, pumps, etc.) shall be furnished and installed under Division 15, except where noted differently on the plans.

3.07.2 Division 16 is responsible for providing power wiring up to a termination point adjacent to mechanical equipment. This termination point may consist of a junction box, starter, drives, disconnect switch, etc. Line side termination to this equipment shall be supplied by the electrical contractor. Wiring from the termination point to the

## **LINCOLN TON EQUIPMENT SHOP**

mechanical equipment, including final connections, shall be provided under Division 15.

3.07.3 Duct smoke detectors shall be furnished and wired by Division 16, installed by Division 15. Shut down circuits shall be wired from the fire alarm control panel to a termination point, adjacent to the AHU control, under Division 16. AHU control wiring from the termination point to the equipment shall be under Division 15.

3.07.4 All relays, actuators, timers, and miscellaneous other devices associated with equipment under Division 15 shall be furnished, installed and wired under Division 15.

3.07.5 All control wiring shall be by Division 15.

3.07.6 All roof exhaust fan motors shall be wired to built-in disconnects provided under Division 15, except where noted differently on the plans.

3.07.7 All control and interlock wiring shall be performed by the respective contractors, except where noted on plans.

### **3.08 FLASHING AND WATERPROOFING:**

All building penetrations to the outside shall be flashed and counter-flashed as required to eliminate leaks.

### **3.09 TESTS:**

See Section 16050 for required tests.

### **3.10 CLEAN-UP:**

Where all work has been finally tested, this Contractor shall clean all work installed by him, including all fixtures, equipment, and all exposed work.

**END OF SECTION**



# LINCOLN TON EQUIPMENT SHOP

## SECTION 16050 - BASIC MATERIALS AND METHODS

### PART 1 - GENERAL

#### 1.01 SCOPE:

Work of this Section shall include specification of electrical devices to be used in subsequent sections and shall include the following principal items:

- Raceways
- Wires and Cables
- Outlet and Junction Boxes
- Wiring Devices
- Device Plates
- Mounting Heights
- Identification and Nameplates

#### 1.02 REFERENCED STANDARDS

- NFPA 70 - National Electrical Code
- NFPA 101 - Life Safety Code

### PART 2 - PRODUCTS

#### 2.01 ABOVE GROUND RACEWAYS:

2.01.1 All wiring indicated including power wiring, emergency systems wiring (NEC Article 700), temperature control wiring, communication wiring where indicated, etc., shall be in separate raceways. All wiring shall be in raceway. BX, MC, AC, NM and other cable assemblies shall not be used.

2.01.2 Flexible metal conduit may be used for final connections to recessed lighting fixtures and shall be used for final connections to motors and transformers. Maximum length permitted is 72 inches. Use "liquid-tight" type for outdoor installations.

2.01.3 Conduit shall be sized in accordance with the latest edition of the NEC unless shown otherwise, with minimum conduit size being 1/2 inch. Flexible metal and watertight ("sealtite") conduit in sizes 1/2 inch and larger are acceptable for motor, appliance and fixture connections provided green wire is installed and NEC is followed.

2.01.4 Conduit, exposed and concealed (except "in slab" conduits), shall be neatly installed parallel to, or at right angles to beams, walls and floors of buildings.

2.01.5 Conduit types may be utilized as permitted by the NEC, with the following restrictions:

## LINCOLN TON EQUIPMENT SHOP

- a. EMT shall not be installed where tubing, couplings, elbows and fittings would be in direct contact with the earth; underground (in/below slab-on-grade or in earth); or any location where the tubing, etc., would be exposed to the elements.
- b. EMT shall not be installed where exposed to severe corrosive influence.
- c. EMT shall not be installed where exposed to severe physical damage.

2.01.6 The raceway system shall not be relied upon for grounding continuity.

2.01.7 The use of "LB's" shall be limited where possible. Where necessary to use "LB's" sized above 2 inch, mogul units shall be installed.

2.01.8 PVC Schedule 40 shall not be used.

2.01.9 Metal surface raceways equal to Wiremold shall be used at existing construction where concealment is impractical. Acceptable manufacturers: Wiremold, Panduit and National.

### 2.02 UNDERGROUND RACEWAYS:

2.02.1 Raceways run external to building foundation walls, with the exception of branch circuit raceways, shall be encased with a minimum of three (3) inches of concrete on all sides.

- a. Encased raceways must have a minimum cover of eighteen (18) inches, except for raceways containing circuits with voltages above 600 volts, which must have a minimum cover of thirty (30) inches.
- b. Encased raceways shall be of a type approved by the NEC as "suitable for concrete encasement."

2.02.2 Branch circuit raceways run underground external to building foundation walls shall be run in raceways installed in accordance with the NEC, and shall be of a type approved by the NEC as "suitable for direct burial." Minimum raceway size shall be 3/4 inch.

2.02.3. All underground raceways shall be identified by underground line marking tape located directly above the raceway at 6 to 8 inches below finished grade. Tape shall be permanent, bright-colored, continuous printed, plastic tape compounded for direct burial not less than 6 inches wide and 4 mils thick. Printed legend shall be indicative of general type of underground line below.

2.02.4. Raceways run underground internal to building foundation walls shall be of a type and installed by a method approved by the NEC.

## LINCOLN TON EQUIPMENT SHOP

2.02.5. At all locations where underground raceways are required to turn up in the slab, including poles bases, the elbow required and the stub-up out of the slab or earth shall be of rigid steel.

2.02.6. The raceway system shall not be relied on for grounding continuity.

2.02.7. Where passing through a "below grade" wall from a conditioned interior building space, raceways shall be sealed utilizing fittings similar and equal to OZ/GEDNEY type "FSK" thru-wall fitting with "FSKA" membrane clamp adapter if required.

### 2.03 TERMINATION

2.03.1 IMC and GRC shall terminate with either a double locknut/bushing set, or in a threaded hub.

2.03.2 Where concentric, eccentric or over-sized knockouts are encountered, a grounding-type insulated bushing shall be provided.

2.03.3 EMT terminations shall be made utilizing steel-plated hexagonal compression connectors of the insulated throat type. NO POT METAL or INDENTED type fittings shall be utilized.

2.03.4 EMT terminations shall be concrete tight where buried in masonry or concrete. EMT fittings, where installed in damp locations, shall be the rain tight type.

### 2.04 CONDUIT COUPLINGS

2.04.1 Where conduits of any type pass over a building expansion joint, a standard "expansion joint fitting", compatible with the type raceway in use, shall be provided.

2.04.2 Conduit couplings for IMC, GRC and PVC shall be in accordance with NEC.

2.04.3 EMT couplings shall be of the plated steel hexagonal compression type. No pot metal, set screw or indented type couplings shall be utilized.

2.04.4 EMT couplings shall be concrete tight where buried in masonry or concrete. EMT couplings, where installed in damp locations, shall be of the rain tight type.

### 2.05 BUILDING WIRES AND CABLES (600 VOLTS AND LESS)

2.05.1 Provide all wiring as indicated and/or required to each piece of equipment, wiring device, lighting fixture, etc. Provide control/interlock wiring as described in Section 16010.

2.05.2 All wire sizes specified shall be in accordance with and designated by AWG (American Wire Gauge).

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2.05.3 Copper conductors equal to Anaconda, Phelps-Dodge, Southwire or General Electric shall be used throughout unless specifically noted otherwise. The design is based on copper conductors only.

2.05.4 No aluminum conductors may be used on this project.

2.05.6 Color coding of conductor insulation shall be uniform throughout the project. The secondary service, feeders and branch circuits shall be color coded as follows:

	<u>120/208 volts</u>	<u>277/480 volts</u>
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Natural Gray
Ground	Green	Green

No other colors may be used for branch circuits. Main feeders must be taped at panelboard terminations. From left to right, the first bus in each panel shall be phase "A", middle "B", and right bus "C".

2.05.7 All wire and cable shall be listed by an approved third party testing agency.

### 2.05.8 Conductors

- a. Power and lighting circuits #10 AWG and smaller shall have solid copper conductors. Conductor sizes #8 AWG and larger shall have Class B stranded conductors.
  1. Fire alarm and control wiring shall have stranded copper conductors.
- b. The minimum conductor size for all power and lighting circuits shall be #12 AWG. The maximum conductor size allowed shall be 500 kcmil.
  1. Fire alarm and control wiring shall be #14 AWG minimum.

### 2.05.9 Insulation

- a. The insulation type for interior wiring shall be dual-rated THHN/THWN.

### 2.05.10 Voltage Drop

- a. Where conductor lengths from the panel to the first outlet on a 277v circuit exceeds 125 feet, the branch circuit conductors from the panel to the first outlet shall not be smaller than #10 AWG.

## LINCOLN TON EQUIPMENT SHOP

- b. Where the conductors length from the panel to the first outlet on a 120v circuit exceeds 50 feet, the branch circuit conductors from the panel to the first outlet shall not be smaller than #10 AWG.

### 2.05.11 Splicing

- a. Joints in solid conductors shall be spliced using Ideal "wirenuts", 3M Company "Scotchlock" or T&S "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 and gum rubber tape or friction tape. Solderless mechanical connectors 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 and no splicing shall be made except within outlet or junction boxes, troughs and gutters.

### 2.06 OUTLET AND JUNCTION BOXES:

2.06.1 Provide metallic galvanized boxes per the N.E.C. at each outlet location indicated on the drawings or as required.

2.06.2 Boxes at exterior locations shall be cast aluminum with threaded hubs and gasketed in-use type covers.

2.06.3 The owner reserves the right to make minor adjustments to the locations of outlet boxes prior to rough-in.

2.06.4 Sizes and configuration of boxes shall be as required for the intended service and shall conform to and be applied in accordance with the N.E.C. Provide extension rings, expandable bars sets, supports, gaskets for weatherproof type, where required. Boxes shall be equal to Steel City with "CV" bracket or equal by Thomas & Betts or Arlington.

2.06.5 Gang type boxes shall be used where multiple wiring devices are located adjacent to one another, including cast in floor boxes.

2.06.6 Junction boxes shall not be installed above gypsum board ceilings or any location that is not accessible. If the conditions are such that this can not be avoided, the architect shall be notified for approval and this contractor shall supply and install all access panels as required for access to the junction box in question.

## LINCOLN TON EQUIPMENT SHOP

### 2.07 WIRING DEVICES

2.07.1 General: Provide wiring devices as indicated on drawings. Device color shall be ivory unless otherwise indicated. Each type of device on the project shall be of the same manufacturer and catalog number throughout.

#### 2.07.2 Toggle Switches

- a. Toggle switches shall be single pole, three-way, or four-way as indicated on the drawings. Switches shall be of the grounding type, with hex-head grounding screw, rated 20A, 120/277 volt, heavy duty, specification grade, AC only. Lighted handle switches shall have neon lights of the correct voltage rating where indicated on the drawings.
- b. All switches shall have quiet operating mechanisms without the use of mercury switches. The type switch shall be indicated on the drawings.

Single pole	- Hubbell HBL221
Double pole	- Hubbell HBL1222
3-way	- Hubbell HBL1223
4-way	- Hubbell HBL1224
Pilot light	- Hubbell HBL1221-PL

Acceptable manufacturers: Arrow Hart, Bryant, G.E., P & S, Hubbell, Cooper

#### 2.07.3 Duplex receptacles:

- a. 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 20A, 125 volt and the face configuration shall conform to the NEMA Standard No. WDI.101968. 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.
- b. Receptacles shall be industry heavy duty, specification grade, and be mounted vertically. Receptacles mounted over counters, back-splashes, etc., shall be mounted horizontally.
- c. Provide the following and verify mounting height on site with GC & Architect.

Standard	Hubbell HBL5352
Ground fault	Hubbell GF5362
Clock hanger	Cooper 93632 SS plate w/recessed receptacle and integral clock hook.

Acceptable manufacturers: Arrow Hart, Bryant, G.E., P&S., Hubbell, Cooper

## LINCOLN TON EQUIPMENT SHOP

### 2.08 DEVICE PLATES

2.08.1 Cover plates for flush mounted wiring devices and for telephone outlets shall be type "302" stainless steel, standard size, single or ganged as shown on the drawings. Cover plate mounting screws shall be tamper proof screws and shall match the finish and material of the plate, and shall be furnished with the plate by the plate manufacturer. Quantity of 2% spare cover plates of each type shall be provided to the owner.

2.08.2 Switch and receptacle cover plates on exposed work shall be galvanized cast ferrous metal of Feraloy, standard size, and shall be single or ganged as indicated on drawings.

2.08.3 Exterior mounted switch and receptacle plates, and those noted to be weatherproof, PVC cover plates, standard size, single or ganged as indicated on the drawings, and shall be "approved" as "raintight while in use".

2.08.4 Plates on surface mounted boxes not used in conjunction with surface metal raceway system shall be galvanized steel with 1/2" raised face and rounded edges.

2.08.5 Single multi-gang device plates shall be used where multiple devices occur.

2.08.6 Sectionalized plates will not be acceptable.

### 2.09 SUPPORTING DEVICES:

2.09.1 Conduit shall be supported in a method and at a spacing as approved by the NEC, except as described herein.

2.09.2 Conduit shall be supported by approved pipe straps or clamps.

- a. Conduits installed on the interior of exterior building walls shall be spaced off the wall surface a minimum of 1/4 inch using "clamp-backs" or strut.

2.09.3 Pipe straps or clamps shall be secured by means of:

- a. Toggle bolts on hollow masonry.
- b. Metal expansion shields and machine screws, or standard pre-set inserts, on concrete or solid masonry.
- c. Machine screws, or bolts on metal surfaces.
- d. Wood screws on wood construction.

## LINCOLN TON EQUIPMENT SHOP

### 2.10 MOTOR AND CIRCUIT DISCONNECTS: <S>

2.10.1 Provide safety switches at each location indicated on the drawings or required by code. Switches shall be rigidly supported and properly aligned. Switches shall be equal to Square "D" type HD.

- a. Switching mechanism shall be quick-make, quick-break mechanism with handle as integral part of the box. All current carrying parts shall be electroplated.
- b. Enclosures shall be NEMA 1 for interior locations and NEMA 3R for exterior locations, and shall be of code gauge steel (galvanized for NEMA 3R) with baked enamel finish and shall have locking hasp.
- c. Ratings, fusing provisions, poles, etc., shall be as indicated.
- d. Safety switches shall be the "heavy duty" type. General duty switches are not acceptable.
- e. Safety switches shall be third-party listed.
- f. Switches shall have defeatable door interlocks that prevent the door from opening when the operating handle is in the "on" position.
- g. Switches shall have handles whose positions are easily recognizable in the "on" or "off" position. Padlock shall be provided for switches located in public areas.
- h. Switches shall have non-teasible, positive, quick make-quick break mechanisms.
- i. Switches shall be properly labeled. See Article 3.05 of this Section, Electrical Identification.

2.10.2 General-use snap switches suitable only for use on AC shall be provided to disconnect 120, 208 or 240 volt motors, 2 horsepower or less where indicated. Switch ampere rating shall be 125% of motor full-load current.

2.10.3 Manual Motor Switches shall be provided as indicated. Units shall have NEMA 1 surface mounted enclosures unless otherwise indicated. Switches not located adjacent to equipment served shall have pilot lights. Devices shall be equal to Sq D type KG-1/2.

2.10.4 Refer also to Section 16010, article 3.07 for division of work between Division 15 and Division 16 trades.

Acceptable manufacturers: Square D, General Electric, Cutler Hammer, and Siemens.



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### 2.11 GROUNDING AND BONDING:

2.11.1 Grounding conductors, where insulated, shall be colored solid green. Conductors intended as neutral shall be colored solid white on 120/208 volt circuits and neutral gray on 277/480 volt circuits.

2.11.2 The raceway system shall not be relied upon for ground continuity. A green grounding conductor, properly sized per NEC Table 250-122, shall be run in ALL raceways. Exceptions are as follows:

- a. Raceways for telecommunications.
- b. Raceways for data.
- c. Raceways for audio conductors.

2.11.3 Boxes with concentric, eccentric or over-sized knockouts shall be provided with bonding bushings and jumpers. The jumper shall be sized per NEC Table 250-122 and lugged to the box.

## PART 3 - EXECUTION

### 3.01 RACEWAYS:

3.01.1 Raceways shall be installed neatly racked, routed parallel or perpendicular to building lines, securely attached and supported. Installation shall conform to applicable sections of N.E.C. Article 342 through 360.

3.01.2 Concealed raceway shall be supported with galvanized stamped steel clamps secured to structure. Conduit shall not be used to support other conduit. Exposed raceways shall be secured to structure with galvanized stamped steel clamps or suspended from structure with beam clamps and conduit hangers.

Grouped raceways shall be supported with galvanized steel channel assemblies equal to Kindorf B-909 and single-bolt straps equal to Kindorf C-105.

Acceptable manufacturers: Unistrut, Power Strut, Globe Strut.

Raceway supports shall be spaced as follows:

- a. rigid metal, IMC or EMT - within 3' of termination or connection & 10' on ctr.
- b. rigid nonmetallic - per NEC paragraph 352.3.
- c. flexible nonmetallic - per NEC paragraph 356.3.

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3.01.3 Raceways shall be concealed where possible in finished areas, and may be exposed in mechanical/electrical equipment rooms.

3.01.4 Provide expansion fittings in all conduits crossing an expansion joint. Fittings shall be O.Z. type "EX" for rigid metal conduit or IMC, and O.Z. type "TX" for EMT. Metallic conduit not containing a grounding conductor shall have O.Z. type "BJ" bonding jumpers installed across expansion joists.

Acceptable manufacturers: Burndy, ITT Blackburn, Thomas & Betts, Anderson.

3.01.5 Pull boxes shall be provided as required for long runs and where excessive turns are encountered.

3.01.6 Grade raceways away from service entrance equipment to prevent water damage.

3.01.7 All conduit penetrations through fire rated ceilings, walls or floors shall be fire stopped using approved materials to maintain the fire rating of the ceiling, wall or floor structure. All penetrations through smoke portions shall also be sealed using approved materials.

### 3.02 WIRES AND CABLES:

3.02.1 All splices, taps, connections, terminations, etc., shall be made with appropriate connectors in a workmanlike manner and in compliance with the N.E.C.

3.02.2 All home runs shall be #12 or larger as indicated. No wire smaller than #12 shall be permitted serving lighting or outlets. Also refer to Article 2.05.10 of this section.

3.02.3 Provide suitable split-wedge cable supporting devices in each conduit riser, as required to properly support vertical cables.

### 3.03 OUTLET AND JUNCTION BOXES

3.03.1 Outlet and Junction Boxes shall be installed in a workmanlike manner, rigidly supported and properly aligned. Unless otherwise noted, boxes shall be flush with finished surfaces.

3.03.2 In masonry walls, rough-in boxes at joints.

3.03.3 Do not rough-in boxes back-to-back.

## LINCOLN TON EQUIPMENT SHOP

### 3.04 MOUNTING HEIGHTS:

Wiring devices & other equipment shall, unless noted otherwise, be mounted as follows:

Fire alarm signals:	Minimum 80" above floor to the bottom, maximum 96" above floor to the top of the device. Verify on-site with Architect.
Fire alarm stations:	4'-0" above floor on center.
Receptacles:	18" above floor or 6" above working surface on center unless noted otherwise on plan.
Switches:	4'-0" above floor on center (OC).
Data / Telephone outlets:	Same as receptacles. Wall phones at 54" above floor OC.
Panelboards:	6'-6" to the top of the panelboard above finished floor.

### 3.05 IDENTIFICATION AND NAMEPLATES:

3.05.1 Furnish and install engraved laminated phenolic "bakelite" nameplates for all safety switches, panelboards, transformers, switchboards, motor control centers and other electrical equipment supplied for the project. The nameplate shall identify the equipment, how it is controlled, where it is served from, phase, voltage, etc. Nameplates shall be securely attached to equipment with self-tapping stainless steel screws, and shall identify equipment controlled, attached, etc. Letters shall be approximately 1/2 inch high, minimum. Embossed, self-adhesive plastic tape is not acceptable for marking equipment. Nameplate material colors shall be:

Blue surface with white core for 120/208 volt equipment

Black surface with white core for 277/480 volt equipment

Bright red surface with white core for all equipment related to fire alarm system

Dark red (burgundy) surface with white core for all equipment related to security

Green surface with white core for all equipment related to "emergency" systems

Orange surface with white core for all equipment related to telephone systems

Brown surface with white core for all equipment related to data systems

White surface with black core for all equipment related to paging systems

Purple surface with white core for all equipment related to TV systems

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3.05.2 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 tags with string or wire attached to conduit and outlet.

3.05.3 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 outlined above. This includes covers on boxes above lift-out and other type accessible ceilings.

### 3.06 ELECTRICAL TESTING:

#### 3.06.1 FEEDER INSULATION RESISTANCE TESTING

a. 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:

1. Minimum readings shall be one million (1,000,000) or more ohms for #6 wire and smaller, 250,000 ohms or more for #4 wire or larger, between conductors and between conductor and the grounding conductor.
2. After all fixtures, 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 this neutral bar. He shall then test each one separately to the panel and until the low readings are found. The contractor shall correct troubles, reconnect and retest until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
3. 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.
4. At final inspection, the contractor shall furnish a megger and show the engineer 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.

## LINCOLN TON EQUIPMENT SHOP

### 3.06.2 DOCUMENTATION

- a. All tests specified shall be completely documented indicating time of day, date, temperature and all pertinent test information.
- b. At final inspection, the contractor shall furnish a megger and show the engineer's representative that the panels comply with the above requirements. He shall also furnish a hook-on type ammeter and a voltmeter, taking current and voltage readings as directed by the engineer.
- c. All required documentation of readings indicated above shall be submitted to the engineer prior to, and as one of the prerequisites for, final acceptance of the project.

**END OF SECTION**

# LINCOLN TON EQUIPMENT SHOP

## SECTION 16400 - SERVICE AND DISTRIBUTION

### PART 1 - GENERAL

#### 1.01 SCOPE:

Work of this Section shall be in accordance with the intent of the Contract Documents and shall include the following principal items:

- Service
- Service Equipment
- Duct Bank
- Panelboards
- Equipment Grounding
- Fuses
- Surge Protection Device (SPD)
- Electrical Load Balancing

#### 1.02 REFERENCED STANDARDS:

- NFPA 70 - National Electrical Code
- NFPA 101 - Life Safety Code

### PART 2 - PRODUCTS

#### 2.01 SERVICE

The new service for the building will be a 600 amp, 208Y/120 volt, 3-phase, 4-wire delivery. The new utility pad-mounted transformer will be located a minimum distance of 20'-0" from the building. This distance complies with the distance requirement from the building of 20'-0" if the transformer is 300KVA or less (maximum of 200 kVA for this facility) and 30'-0" if the unit is more than 300 KVA. The Electrical Contractor shall install the secondary conductors underground in conduit encased in 3" of concrete from the new utility transformer to the service entrance Main Distribution Panel of the Equipment Shop. The Electrical Contractor shall supply facility load information to the electric utility and coordinate all aspects of the service installation with the utility. Load information shall be provided to the utility at the beginning of the project to ensure no problems are encountered.

#### 2.02 SERVICE EQUIPMENT <S>

Square D "HCP I-Line" and "NQOD" panel boards were used as the basis for this design. The contractor is cautioned that space for electrical equipment is limited and attention should be given to size of the equipment included in their pricing.

Acceptable manufacturers: Square D, General Electric and Siemens.

## LINCOLN TON EQUIPMENT SHOP

### 2.02 DUCT BANK

Excavation and backfill shall conform to "Division 2" of the specifications except heavy-duty, hydraulic-operated compaction equipment shall not be used. Trenches shall be cut neatly and uniformly, sloping uniformly to required pitch. Ducts shall be pitched to drain away from buildings and equipment. Minimum slope shall be 4 inches in 100 feet. Concrete encased nonmetallic 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. Separators to the earth and to ducts shall be secured to prevent floating during placement of concrete. Steel or tie wires shall not be used in such a way as to form conductive or magnetic loops around ducts or duct groups. Waterproof marking cord shall be installed in all ducts, including spares, after thoroughly rodding, cleaning and swabbing all ducts free of any and all obstructions. The marking cord shall be 130-pound tensile test (marked at least every foot), equivalent to Greenlee No. 435. All ducts shall be sealed at terminations, using sealing compound and plugs, as required to withstand 15-psi minimum hydrostatic pressure. The installation of conduit in ductbanks should be in accordance with OSHA requirements.

### 2.03 PANELBOARDS <S>

2.03.1 Provide panelboards rated and sized as indicated in the schedule and shown on the plans equal to Square D Company Model NQOD for services up to 240 volts; Model NEH for services up to 480 volts; and "I-Line" for power distribution panels.

2.03.2 Construction features shall include minimum 5" wide gutters, dead front construction, electroplated current carrying parts; UL listed terminals suitable for conductors specified; flush front hinged "door-in-door" construction with cylinder tumbler type locks (all keys alike); circuit directory and frame, code gauge steel, galvanized and baked enamel finish.

2.03.3 Circuit breakers shall be bolt-on type QOB (NQO panelboards), type EHB (NEH panelboards), and type FY and FA (I-line panelboards). Breakers shall be toggle action with quick-make, quick-break mechanism. Trip indication shall be by breaker handle taking a position between ON and OFF. All multi-pole breakers shall be common trip with a single handle. Minimum interrupting rating of breakers shall be as indicated.

2.03.4 Panelboards and fused disconnects identified for use as service equipment shall be labeled as service equipment. Panel bus bars shall be copper. A typed directory card shall be supplied with each panel and it shall be mounted on the door interior. The directory shall indicate what each circuit powers to include room names and specific equipment. Load centers are not acceptable. G.E. Type "A" panels shall be provided with screw covers.

Acceptable manufacturers: Square D, General Electric and Siemens.

## LINCOLNTON EQUIPMENT SHOP

### 2.04 EQUIPMENT GROUNDING

The electrical equipment in the new building shall be grounded per NEC 250.32 and as follows.

- a. To the metallic cold water pipe.
- b. To the steel frame of the building, provided the building frame is effectively grounded.
- c. To ground rods (min. of 2). Ground rods shall be 10 feet long and 3/4 inch in diameter, and shall be of copper-clad steel construction. All ground connections shall be accessible.
- d. To the concrete encased electrode (footing rebar).

Refer also to testing requirements listed in 3.03 of this section.

### 2.05 FUSES (600 VOLTS OR LESS <S>)

2.05.1 Fuses shall be so selected as to provide a fully selective system.

2.05.2 The following criteria shall be followed for fuse selection:

<u>CIRCUIT TYPE</u>	<u>FUSE TYPE</u>
Service Entrance & Feeder Circuits 600A & less	Class RK1 or J U/L listed, current limiting with 200K Amp interrupting rating.
Motor, motor controller & Transformer circuits	Class RK5 U/L listed, current limiting time delay, w/200K Amp AIC
Individual Equipment where fault current does not exceed 50 KA	Class K5 U/L listed, with 50 KA interrupting rating.

The contractor shall provide 10% of each fuse size (size and type) required by the project (with a minimum of one set as spares) to the owner upon completion.

2.05.3 Fusible safety switches with short-circuit withstand ratings of 100K Amp or 200K Amp require Class R or Class J rejection fuse block feature. (Compliance with NEC Article 110-9 and 240-60b.)



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### 2.06 SURGE PROTECTION DEVICE (SPD) <S>

2.06.1 Panel "MDP" shall be protected by a surge suppression device. An SPD unit as shown on the power riser will be required for protection of this panel. Innovative Technology PTX160-3Y101 (160kA) device was used as the bases of design for this project. See below for a list of additional acceptable manufacturers. The device shall have a minimum of a 20-year warranty and coverage must include all anomalies, including lightning. The devices let-through voltage ratings shall include 6" lead length external to the enclosure and the enclosure must be Nema 4 rated for indoor and outdoor use. The SPD shall be UL labeled with a 200kA Short Circuit Current Rating (SCCR) as a Type 1 device and shall be listed as compliant to UL 1449, 3rd Edition. The SPD shall include visual LED diagnostics with one green LED indicator per phase, and one red service LED. The SPD shall be installed in accordance with the manufacturer's installation manual using the recommended breaker and wire sizes.

2.06.2 All SPD units must comply with recent editions of:

- a. Underwriters Laboratories: UL1449 and UL 1283
- b. ANSI/IEEE C62.41.1-2002, C62.41.2-2002, C62.45-2002
- c. National Electrical Code: Article 285

UL 1449 Listed Voltage Protection Ratings (VPRs) shall not exceed the following:

<u>System Voltage</u>	<u>L-N</u>	<u>L-G</u>	<u>L-L</u>	<u>N-G</u>	<u>MCOV</u>
208Y/120	700V	700V	1200V	700V	150V

Submittal shall include a copy of the SPD performance parameters listed at [www.UL.com](http://www.UL.com) under Certifications, searching using Category Code: VZCA, to verify SCCR, VPR and Type 1 compliance. "Manufactured in accordance with" does not demonstrate equivalence to the UL listings and does not meet this specification.

2.06.3 Install the SPD units with the minimum distance from the distribution panel, with the minimum number of turns or bends and with (3) twists induced in the conductors. SPD units must be separate from the panelboard and fed by a circuit breaker from the respective panel.

Acceptable Manufacturers are Innovative Technology, GE, Siemens, Square D, Advanced Protection Technologies and Lea International.

## PART 3 - EXECUTION

### 3.01 ELECTRICAL LOAD BALANCING

3.01.1 The Contractor shall balance electrical loads at each panel so that neutral current flow is reduced to the lowest possible level and all phase conductors (A, B & C) are as equally balanced as possible. Contractor shall relocate circuit breakers or individual branch circuits as required to accomplish electrical load balance.

## **LINCOLNTON EQUIPMENT SHOP**

### **3.02 CIRCUIT BREAKER TESTING:**

For services 1000 amperes and larger, the following tests should be performed on the service circuit breakers and the distribution circuit breakers. On site testing shall be performed by a qualified factory technician. All readings shall be presented in tabulated format.

- a. Phase tripping tolerance (within 20% of U/L requirements).
- b. Trip time (per phase) in seconds.
- c. Instantaneous trip (amps) per phase.
- d. Insulation resistance (in mega ohms) at 100 volts (phase to phase and line to load).

### **3.03 GROUND SYSTEM TESTING:**

Upon completion of installation of the electrical grounding and bonding systems, the ground resistance shall be tested with a ground resistance tester. Where test show resistance to ground is over 25 ohms, appropriate action should be taken to reduce the resistance to 25 ohms, or less, by driving additional ground rods. The grounding and bonding system shall then be retested.

**END OF SECTION**

## LINCOLN TON EQUIPMENT SHOP

### SECTION 16450 - GENERATOR MANUAL TRANSFER SWITCH <S> <OM>

#### 1.0 GENERAL

##### 1.01 Scope

Furnish and install manual (non-automatic) transfer switches (MTS) with number of poles, amperage, voltage, and withstand current ratings as shown on the plans. Each non-automatic transfer shall consist of an inherently double throw power transfer switch unit and a microprocessor controller, interconnected to provide complete operation. All transfer switches and control panels shall be the product of the same manufacturer.

##### 1.02 Acceptable Manufacturers

The basis for design is the manual transfer switch ASCO Series 386. Any alternate shall be submitted to the consulting engineer in writing at least 10 days prior to bid. Each alternate bid must list any deviations from this specification

Acceptable Manufacturers: ASCO, Caterpillar, and Russell Electric.

##### 1.03 Codes and Standards

The manual (non-automatic) transfer switches and accessories shall conform to the requirements of:

- A. UL 1008 - Standard for Automatic Transfer Switches
- B. NFPA 70 - National Electrical Code
- C. NFPA 110 - Emergency and Standby Power Systems
- D. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- E. NEMA Standard ICS 10-1993 (formerly ICS2-447) - AC Transfer Switch Equipment
- F. NEC Article 702
- G. International Standards Organization ISO 9001

#### PART 2 PRODUCTS

##### 2.01 Mechanically Held Transfer Switch

- A. The transfer switch unit shall be manually operated and mechanically held. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.
- B. The switch shall be positively locked and unaffected by momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life.

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- C. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand current capability and be protected by separate arcing contacts.
  - D. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The handle shall permit the operator to manually stop the contacts at any point throughout their entire travel to inspect and service the contacts when required.
  - E. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.
  - F. Where neutral conductors must be switched, the MTS shall be provided with fully-rated neutral transfer contacts.
  - G. Where neutral conductors are to be solidly connected, a neutral terminal plate with fully-rated AL-CU pressure connectors shall be provided.
- 2.02 Enclosure: The MTS shall be furnished in a NEMA type 1 enclosure unless otherwise shown on the plans.

### PART 3 OPERATION

#### 3.01 Controller Operation Provisions

- A. The MTS shall be arranged so that it can be easily converted to automatic operation in the future.

#### 3.02 Additional Features

- A. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of one contact, closed when the MTS is connected to the normal source and one contact, closed, when the MTS is connected to the emergency source.
- B. Indicating lights shall be provided, one to indicate when the MTS is connected to the normal source (green) and one to indicate when the MTS is connected to the emergency source (red). Also provide output signals to drive optional or customer supplied source availability indicating lights.
- C. Inphase Monitor - An Inphase monitor shall be inherently built into the controls. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The inphase monitor shall be specifically designed for and be the product of the MTS manufacturer.
- D. Selective Load Disconnect - A double throw contact shall be provided to operate after a time delay, adjustable to 20 seconds prior to transfer and reset 0 to 20 seconds after transfer. This contact can be used to selectively disconnect specific load(s) when the transfer switch is transferred. Output contacts shall be rated 6 amps at 28 VDC or 120 VAC.

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- E. Source Availability Lights – (Accessory 9C, 9D).
- F. Remote Control Provisions – Provisions for customer supplied 3-position selector switch shall be included (Accessory 43M).
- G. Auxiliary Contacts – Aux. contacts to indicate switch position (Acc.14A, 14B).
- H. Communications Interface - A full duplex RS485 interface to provide remote monitoring and control by ASCO communications products (Accessory 72A).

### PART 4 ADDITIONAL REQUIREMENTS

#### 4.01 Withstand and Closing Ratings

- A. The MTS shall be rated to close on and withstand the available rms symmetrical short circuit current at the MTS terminals with the type of overcurrent protection shown on the plans. WCR MTS ratings as be as follows when used with specific circuit breakers:

MTS Size	Withstand & Closing Rating MCCB	W/CLF
30 – 200	22,000A	200,000
225 – 400	42,000A	200,000
600 – 1200	65,000A	200,000
1600 – 2000	85,000A	200,000
2600 – 3000	100,000A	200,000

#### 4.02 Tests and Certification

- A. The complete MTS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the voltage, frequency and time delay settings are in compliance with the specification requirements.
- B. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards, and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.
- C. The MTS manufacturer shall be certified to ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001.

#### 4.03 Service Representation

- A. The MTS manufacturer shall maintain a national service organization of company-employed personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

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- B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.
- C. For ease of maintenance and parts replacement, the switch nameplate shall include drawing numbers, part numbers for main coil and control.

**END OF SECTION**

# LINCOLN TON EQUIPMENT SHOP

## SECTION 16500 - LIGHTING

### PART 1: GENERAL

#### 1.01 SCOPE:

Work of this Section shall include the following items:

Interior fluorescent  
Exterior fluorescent  
Exterior HID  
Occupancy Sensors

#### 1.02 REFERENCED STANDARDS

NFPA 70 - National Electrical Code  
NFPA 101 - Life Safety Code

### PART 2 - PRODUCTS

#### 2.01 LIGHTING FIXTURES AND LAMPS <S>

2.01.1 Provide fixtures including interior and exterior fixtures as indicated on the plans and described in the schedule. Acceptable manufacturers: Thomas, Hubbell, Cooper

2.01.2 Fixtures shall be complete with lamps as indicated, ballasts, internal wiring, brackets, fittings, lenses, louvers, guards, reflectors, pole supports and accessories as required, indicated or detailed.

2.01.3 Ballasts for HID fixtures shall be high power factor constant wattage autotransformer type.

2.01.4 Lamps shall be provided as indicated in the schedule. Nomenclature is based on General Electric lamp code numbers. Comparable lamps by Westinghouse, Philips, Norelco, or Sylvania are acceptable.

2.01.5 All battery packs supplying emergency lighting fixtures shall be capable of sustained operation for at least 90 minutes without any degradation in performance and without going into deep cell discharge. See additional requirements below:

- a. When the fixture is powered by the battery pack, at least one third of the normal light output shall be available for emergency lighting.
- b. All emergency lights shall have a lighted push-to-test button clearly visible and accessible.

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- c. All battery packs shall be NICAD unless noted otherwise on the plans.

### 2.01.6 EMERGENCY EXIT LIGHTING FIXTURES

- a. The Exit light fixtures shall be completely self-contained and be provided with a maintenance-free battery and automatic charger. The fixtures must be third-party listed as emergency lighting equipment and meet or exceed the following standards: National Electrical Code, N.C. Building Code, NC 2009 Energy Conservation Code, NFPA-101 and NEMA Standards.

#### 2.01.6.1 BATTERY

- a. The battery shall be a sealed, maintenance-free type with a minimum of 90 minutes operating time. It shall have a life expectancy of 10 years. It shall be a high temperature type with an operating temperature range of 0 to 60 degrees C. The battery shall contain a resealable pressure vent, a sintered (+) positive terminal and (-) negative terminal.

#### 2.01.6.2 CHARGER

- a. The charger shall be a current limiting, full wave rectifying, fully automatic solid state type. The 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 percent. If a LEAD battery is used, a low voltage disconnect switch shall be included to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.

#### 2.01.6.3 ADDITIONAL FEATURES

- a. The unit shall have a pilot light to indicate the unit is connected to AC power. The battery shall have high rate charge pilot light, unless it is a self-diagnostic type. A test switch is also required to simulate the loss of power.

#### 2.01.6.4 WARRANTY

- a. The entire unit shall be warranted for three years with an additional two more years of pro-rated warranty for the battery. The warranty shall start the date of project final acceptance and be included in contract documents.

#### 2.01.6.5 LED

- a. The use of LED lamps is required. The maximum LED failure rate is 25% within a seven (7) year period. If that maximum is exceeded, the manufacturer shall replace the complete unit at no charge to the owner.



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### 2.01.6.6 UNIT TEST

- a. Contractor shall perform a test on each unit after permanent installation and charged a minimum of 24 hours. The battery shall be tested for 90 minutes in accordance with NEC 700.12 (F). The battery test shall be done 10 days prior to final inspection by the State Construction Office. Any unit failing the test must be repaired or replaced, and tested again. A copy of the test report shall be sent to the State Construction Office.

### 2.01.7 EMERGENCY EGRESS FIXTURE

- a. It shall be completely self-contained (or remote battery backup as shown on plans), provided with a maintenance-free 12 volt battery, automatic charger, two lamps and other features. Fixture must be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, N.C. Building Code, NC 2009 Energy Conservation Code, NFPA-101, and NEMA Standards.

#### 2.01.7.1 ADDITIONAL FEATURES

- a. It shall have a pilot light to indicate the unit is connected to A.C power and a test switch to simulate the operation of the unit upon loss of A.C power by energizing the lamps from the battery. This simulation must also exercise the transfer relay. If a fluorescent emergency unit is used, an LED charging indicator light must be easily visible after installation and a remote test switch shall be installed adjacent to the fixture.

#### 2.01.7.2 BATTERY

- a. The battery shall be a sealed, maintenance-free type with minimum of 90 minutes operating time. It shall have a life expectancy of 10 years. It shall be a high temperature type with an operating temperature range of 0 to 60 degrees C. The battery shall contain a resealable pressure vent and a sintered positive (+) terminal and a negative (-) terminal.

#### 2.01.7.3 CHARGER

- a. The charger shall be a current limiting, full wave rectifying, fully automatic type. It shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. It shall be activated when the voltage drops below 80 percent. If a LEAD Battery is used, a low voltage disconnect switch shall be included to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.

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### 2.01.7.4 WARRANTY

- a. The entire unit shall be warranted for three years with an additional two more years' pro-rated warranty for the battery. Warranty shall start the date of project final acceptance and shall be included in contract documents.

### 2.01.7.5 UNIT TEST

- a. 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 in accordance with NEC 700.12 (F). 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. A copy of the test report shall be sent to the State Construction Office.

### 2.01.7.6 ELECTRONIC BALLAST

- a. Ballast must be "UL Listed, Class P", with a sound rating of "A". No PCB ballast are permitted. The ballast size will be a maximum size of that of a magnetic ballast.
- b. Light regulation shall be +/- 10% input voltage variation, and a high power factor with a minimum of 90%.
- c. Lamp current crest factor shall be equal to, or less than, 1.7.
- d. Input current third harmonics shall not exceed ANSI recommendations (32% total harmonic distortion, 27.5% of the third triplets). Ballast shall also meet FCC Rules and Regulations.
- e. Minimum of five (5) years warranty is required with each electronic ballast. The ballast manufacturer shall have a minimum of 5 years experience in electronic ballast manufacturing.
- f. Flicker shall be 15% or less with any lamp suitable for the ballast.
- g. Parallel wiring between the ballast and the fixture is recommended.
- h. Ballast case temperature shall not exceed 25 degrees C rise over 40 degrees C ambient.

## LINCOLN TON EQUIPMENT SHOP

### 2.02 OCCUPANCY SENSORS

The layout of occupancy sensors is based on Hubbell Building Automation (HBA) devices. Detectors shall utilize Dual Technology ultrasonic and passive infrared sensing. Other brand systems must provide the same amount of occupancy sensor coverage and performance. All associated equipment (power packs, etc) required for a complete installation shall be included and installed as per manufacturer's recommendation. Submittal of occupancy sensor layout prepared by the proposed manufacturer is required. Floor plan AutoCAD drawings will be provided to the proposed manufacturer upon request via e-mail.

- a. Devices shall utilize multi-technology control by combining both ultrasonic (US) for macro-motion and passive infrared (PIR) in areas where called for on the plans. The unit shall have adaptive technology that continuously analyzes its environment and self-adapts, eliminating the need for manual sensitivity and timer adjustments during installation as well as over the life of the unit. The unit shall have selectable operating modes, automatic ON/OFF or manual ON/automatic OFF. The unit shall be rated for 120VAC operation.
- b. Wall mounted switches shall be single or dual circuit (as required for dual level switching or step dimming) as noted on the drawings. The sensors are various types depending on the area of coverage. There are wall mounted switches, wall mounted sensors and ceiling mounted sensors as shown on the construction drawings. The installation must be so that they operate with single and dual level override light switches shown on the construction drawings.
- c. Ceiling mounted sensors shall be 360 degree or 180 degree operation as noted on the drawings.
- d. All sensors shall have a five (5) year warranty.
- e. All sensors shall be Ivory in color unless noted otherwise.
- f. The contractor shall supply and install complete system including all power packs, low voltage wiring, etc, for a fully operational system.
- g. Sensor locations shown on the drawings are approximate. The contractor shall refer to the manufacturer's installation instructions prior to installation.

## **LINCOLN TON EQUIPMENT SHOP**

### **PART 3 - EXECUTION**

#### **3.01 LIGHTING FIXTURES**

3.01.1 Installation methods for each fixture shall be as indicated or detailed and as recommended by the fixture manufacturer for the application. Supports such as mounting brackets, hangers, clamps, etc., shall be provided in the best practical manner consistent with good workmanship and appearance.

3.01.2 Lay-in fluorescent fixtures shall be supported at the two opposite ends to the steel frame of the building. Supports shall be provided with the same type of wire as used to support the lay-in ceiling track. Attach one end of the wire to one corner of the fixture and the other end to the building structural system. The fixture shall then be screwed with sheet metal screws to the main runners of the grid at all four corners.

3.01.3 In the event of fixture damaged during construction and prior to final acceptance of the project the fixture shall be replaced or repaired to the satisfaction of the Engineer.

3.01.4 The contractor shall note architectural finish schedules and existing conditions and furnish proper mounting accessories or trim as required to properly mounting each fixture type.

3.01.5 Recessed fixtures shall be provided with mounting frames or rings and shall finish flush to the ceiling without light leaks. Fixtures shall be connected by means of flexible metal conduit (maximum of 6'-0" length whips unless approved by SCO) from outlet boxes mounted above or alongside the fixture. Where recessed fixtures are installed in "hard" ceilings, lighting branch circuit wiring shall be installed in conduit (EMT, etc.) from fixture to fixture and to switching.

3.01.6 Fixtures exposed to outdoor temperatures shall be rated for 0 degree Fahrenheit operation.

**END OF SECTION**

## **LINCOLNTON EQUIPMENT SHOP**

### **SECTION 16700 - COMMUNICATIONS**

#### **GENERAL SCOPE**

Work of this Section shall be in accordance with the intent of the Contract Documents and shall include the following principal items:

Telephone/Data Outlets

#### **TELEPHONE/DATA CABLING SYSTEM:**

Provide telephone and data outlet boxes with 1" conduit stubbed up above the ceiling to the plenum return. All raceways shall be a minimum of 1" unless a different size is indicated on drawings. The owner will be responsible for installing all cabling, hardware/software and making final terminations.

**END OF SECTION**



**LINCOLNTON EQUIPMENT SHOP**

**FORM OF PROPOSAL**

**LINCOLNTON EQUIPMENT SHOP**

N. C. Department of Transportation  
ID#: 09-07920-01A

Contract: \_\_\_\_\_  
Bidder: \_\_\_\_\_  
Date: \_\_\_\_\_

The undersigned, as bidder, hereby declares that the only person or persons interested in this proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud. The bidder further declares that he has examined the site of the work and the contract documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed.

The Bidder proposes and agrees if this proposal is accepted to contract with the State of North Carolina, through the NC Department of Transportation in the form of contract specified below, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the construction of the new Lincolnton Equipment Shop in full in complete accordance with the plans, specifications and contract documents, to the full and entire satisfaction of the State of North Carolina, and NC Department of Transportation, and Facilities Design Unit with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and the contract documents, for the sum of:

**Single Prime Contract:**

Base Bid: \_\_\_\_\_ Dollars \$ \_\_\_\_\_

_____	_____	Dollars \$ _____
General Contractor	License No	
_____	_____	Dollars \$ _____
Plumbing Subcontractor	License No	
_____	_____	Dollars \$ _____
HVAC Subcontractor	License No	
_____	_____	Dollars \$ _____
Electrical Subcontractor	License No	
_____	_____	Dollars \$ _____
Site / Utility Subcontractor	License No	

**Unit Price:** The amount written below shall be the amount to be "added to" or "deducted from" the base bid; see Section 02100 for the Rock Excavation and replacement with suitable soils; the Unit Price shall include the costs of excavation and disposal of rock material and the placement and compaction of select material; the Base Bid shall include an allowance of 10 cu.yds. for the removal of expected rock.

Unit Price: Undercut Excavation Dollars \$ \_\_\_\_\_ /Cu.Yd.

The bidder further proposes and agrees hereby to commence work under this contract on a date to be specified in a written order of the designer and shall fully complete all work thereunder within, **240 calendar days** the time specified in the Supplementary General Conditions. Applicable liquidated damages amount is also stated in the Supplementary General Conditions Article 23.

**Minority Business Participation Requirements:**

Provide on the bid - Under GS 143-128.2(c) the undersigned bidder shall identify **on its bid** the minority businesses that it will use on the project **and** the total dollar value of the bid that will be performed by the minority businesses **and** list the good faith efforts (Affidavit **A**) made to solicit participation

**Note:** A contractor that performs all of the work with its own workforce may submit an Affidavit (**B**) to that effect in lieu of the affidavit (**A**) required above.

After the bid opening - The Owner will consider all bids and alternates and determine the lowest responsible, responsive bidder. Upon notification of being the apparent low bidder, the bidder shall then file within 72 hours of the notification of being the apparent lowest bidder, the following:

An Affidavit (**C**) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the 10% goal established. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort;

**Or**

Affidavit (**D**) of its good faith effort to meet the goal. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.

**Note:** Bidders must submit **with their bid** the Identification of *Minority Business Participation* list **and** *Affidavit A* **or** *Affidavit B* as applicable. Failure to file a required affidavit or documentation with the bid or after being notified apparent low bidder may be grounds for rejection of the bid.



**Proposal Signature Page**

The undersigned further agrees that in the case of failure on his part to execute the said contract and the bond within ten (10) consecutive calendar days after written notice being given of the award of contract, the certified check, cash or bid bond accompanying this bid shall be paid into the funds of the owner's account set aside for the project, as liquidated damages for such failure; otherwise the certified check, cash or bid bond accompanying this proposal shall be returned to the undersigned.

Respectfully submitted this day of \_\_\_\_\_

\_\_\_\_\_  
(Name of firm or corporation making bid)

WITNESS:

\_\_\_\_\_  
(Proprietorship or Partnership)

By:

Title \_\_\_\_\_

\_\_\_\_\_  
(Owner/Partner/Pres./V.Pres)

Address \_\_\_\_\_

License No. \_\_\_\_\_

Federal I.D. No. \_\_\_\_\_

ATTEST:

By: \_\_\_\_\_

Title: \_\_\_\_\_

(Corp. Sec. or Asst. Sec. only)

(CORPORATE SEAL)

Addendum received and used in computing bid:

Addendum No. 1 \_\_\_\_\_

Addendum No. 2 \_\_\_\_\_

Addendum No. 3 \_\_\_\_\_

Addendum No. 4 \_\_\_\_\_



## Identification of HUB Certified/ Minority Business Participation

I, \_\_\_\_\_  
(Name of Bidder)

do hereby certify that on this project, we will use the following HUB Certified/ minority business as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #	Work Type	*Minority Category	**HUB Certified (Y/N)

\*Minority categories: Black, African American (B), Hispanic (H), Asian American (A) American Indian (I), Female (F) Socially and Economically Disadvantaged (D)

**\*\* HUB Certification with the state HUB Office required to be counted toward state participation goals.**

**The total value of minority business contracting will be (\$)\_\_\_\_\_.**



# State of North Carolina AFFIDAVIT A – Listing of Good Faith Efforts

County of \_\_\_\_\_

(Name of Bidder)

Affidavit of \_\_\_\_\_

I have made a good faith effort to comply under the following areas checked:

**Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive.** (1 NC Administrative Code 30 I.0101)

- 1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- 2 – (10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- 3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- 4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- 5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- 6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- 7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- 8 – (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- 9 – (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- 10 – (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

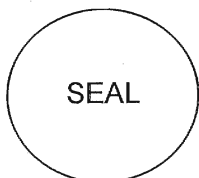
The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure to abide by this statutory provision will constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of the minority business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of \_\_\_\_\_, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_

# State of North Carolina --AFFIDAVIT B-- Intent to Perform Contract with Own Workforce.

County of \_\_\_\_\_

Affidavit of \_\_\_\_\_

(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the \_\_\_\_\_

\_\_\_\_\_ contract.  
(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

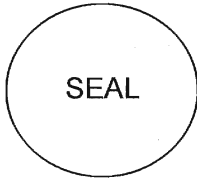
The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement. The Bidder agrees to make a Good Faith Effort to utilize minority suppliers where possible.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of \_\_\_\_\_, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_



**State of North Carolina - AFFIDAVIT C - Portion of the Work to be Performed by HUB Certified/Minority Businesses**  
 County of \_\_\_\_\_

**(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)**

If the portion of the work to be executed by HUB certified/minority businesses as defined in GS143-128.2(g) and 128.4(a),(b),(e) is equal to or greater than 10% of the bidders total contract price, then the bidder must complete this affidavit.  
 This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of \_\_\_\_\_ I do hereby certify that on the \_\_\_\_\_  
 (Name of Bidder)

Project ID# \_\_\_\_\_ (Project Name) Amount of Bid \$ \_\_\_\_\_

I will expend a minimum of \_\_\_\_\_% of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. Attach additional sheets if required

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

\*Minority categories: Black, African American (B), Hispanic (H), Asian American (A) American Indian (I), Female (F) Socially and Economically Disadvantaged (D)  
**\*\* HUB Certification with the state HUB Office required to be counted toward state participation goals.**

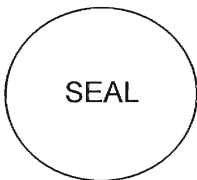
Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of \_\_\_\_\_, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_





# State of North Carolina AFFIDAVIT D – Good Faith Efforts

County of \_\_\_\_\_

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 10% participation by HUB Certified/ minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of \_\_\_\_\_ I do hereby certify that on the  
(Name of Bidder)

Project ID# \_\_\_\_\_ (Project Name) Amount of Bid \$ \_\_\_\_\_

I will expend a minimum of \_\_\_\_\_% of the total dollar amount of the contract with HUB certified/ minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required)

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

\*Minority categories: Black, African American (B), Hispanic (H), Asian American (A) American Indian (I), Female (F) Socially and Economically Disadvantaged (D)

**\*\* HUB Certification with the state HUB Office required to be counted toward state participation goals.**

Examples of documentation that may be required to demonstrate the Bidder's good faith efforts to meet the goals set forth in these provisions include, but are not necessarily limited to, the following:

- A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.
- B. Copies of quotes or responses received from each firm responding to the solicitation.
- C. A telephone log of follow-up calls to each firm sent a solicitation.
- D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.
- E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.
- F. Copy of pre-bid roster
- G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.
- H. Letter detailing reasons for rejection of minority business due to lack of qualification.
- I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of \_\_\_\_\_, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_

**LINCOLN TON EQUIPMENT SHOP**

**BID BOND**

KNOW ALL MEN BY THESE PRESENTS, THAT WE

\_\_\_\_\_

as Principal, and

\_\_\_\_\_

\_\_\_\_\_

as Surety, who is duly licensed to act as Surety in North Carolina, are

held unto the State of North Carolina through

\_\_\_\_\_

\_\_\_\_\_

as Obligee, in the penal sum of

\_\_\_\_\_

DOLLARS, lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Signed, sealed and dated that \_\_\_\_\_ day of \_\_\_\_\_ 2012

WHEREAS, the said Principal is herewith submitting proposal for

and the principal desires to file this Bid Bond in lieu of making the cash deposit as required by G.S. 143-129.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that if the principal shall be awarded the contract for which the bid is submitted and shall execute the contract and give bond for the faithful performance thereof within ten days after the award of same to the principal, then this obligation shall be null and void; but if the principal fails to so execute such contract and give performance bond as required by G.S. 143-129, the Surety shall, upon demand, forthwith pay to the obligee the amount set forth in the first paragraph hereof. Provided further, that the bid may be withdrawn as provided by G.S. 143-129.1.

\_\_\_\_\_ (SEAL)

\_\_\_\_\_ (SEAL)

\_\_\_\_\_ (SEAL)

\_\_\_\_\_ (SEAL)



CONSTRUCTION CONTRACT

THIS AGREEMENT, made the \_\_\_\_ day of \_\_\_\_ in the year of 2012 by and between

hereinafter called the Party of the First Part and the State of North Carolina; through the NC DEPARTMENT OF TRANSPORTATION hereinafter called the Party of the Second Part.

**WITNESSETH:**

That the Party of the First Part and the Party of the Second Part for the consideration herein named agree as follows:

1. Scope of Work: The Party of the First Part shall furnish and deliver all of the materials, and perform all of the work in the manner and form as provided by the following enumerated plans, specifications and documents, which are attached hereto and made a part thereof as if fully contained herein: Advertisement, Instructions to Bidders, General Conditions, Supplementary General Conditions, Specifications, Accepted Proposal, Contract Performance Bond, Payment Bond, Power of Attorney, Workmen's Compensation, Public Liability, Property Damage and Builder's Risk Insurance Certificates, Approval of Attorney General, Certificate by the Office of State Budget and Management, and Drawings, entitled:

**LINCOLN TON EQUIPMENT SHOP**

Consisting of the following sheets **T1, A1- A9, S1- S4, P1-P4, M1-M4, E1-E6, and C1- C9,**

Dated: **7 December 11** and the following addenda:

Addendum No. \_\_\_\_, Dated \_\_\_\_\_ **2012.**

2. The Party of the First Part shall commence work to be performed under this Agreement on a date to be specified in a written order of the Party of the Second Part and shall fully complete all work hereunder **within 240 calendar days** of said date. For each day in excess thereof, liquidated damages shall be as stated in Supplementary General Conditions. The Party of the First Part, as one of the considerations for the awarding of this Contract, has furnished to the Party of the Second Part a construction schedule setting forth planned progress of the building, broken down by the various divisions or parts of the work and by calendar days. If the Party of the First Part fails to begin the work under the contract within the time specified, or the progress of the work is not maintained on schedule, or the work is not completed within the time above specified, or fails to perform the work with sufficient workmen and equipment or with sufficient materials to ensure the prompt completion of said work, or shall perform the work unsuitably or shall discontinue the prosecution of the work, or if the Party of the First Part shall become insolvent or be declared bankrupt or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against him unsatisfied for a period of forty-eight (48) hours, or shall make an assignment for the benefit of creditors, or for any other cause whatsoever shall not carry on the work in an acceptable manner, the Party of the Second Part may give notice in writing, sent by certified mail, return receipt requested, to the Party of the First Part and his surety of such delay, neglect or default, specifying the same, and if the Party of the First Part within a period of fifteen (15) days after such notice shall not proceed in accordance therewith, then the Party of the Second Part shall, declare this contract in default, and, thereupon, the surety shall promptly take over the work and complete the performance of this contract in the manner and within the time frame specified. In the event the surety shall fail to take over the

# LINCOLNTON EQUIPMENT SHOP

work to be done under this contract within fifteen (15) days after being so notified and notify the Party of the Second Part in writing, sent by certified mail, return receipt requested, that he is taking the same over and stating that he will diligently pursue and complete the same, the Party of the Second Part shall have full power and authority, without violating the contract, to take the prosecution of the work out of the hands of said Party of the First Part, to appropriate or use any or all contract materials and equipment on the grounds as may be suitable and acceptable and may enter into an agreement, either by public letting or negotiation, for the completion of said contract according to the terms and provisions thereof or use such other methods as in his opinion shall be required for the completion of said contract in an acceptable manner. All costs and charges incurred by the Party of the Second Part, together with the costs of completing the work under contract, shall be deducted from any monies due or which may become due said Party of the First Part and surety. In case the expense so incurred by the Party of the Second Part shall be less than the sum which would have been payable under the contract, if it had been completed by said the Party of the First Part, then the said Party of the First Part and surety shall be entitled to receive the difference, but in case such expense shall exceed the sum which would have been payable under the contract, then the Party of the First Part and the surety shall be liable and shall pay to the Party of the Second Part the amount of said excess.

3. The Party of the Second Part hereby agrees to pay to the Party of the First Part of the faithful performance of this Agreement, subject to additions and deductions as provided in the specifications or proposal, in lawful money of the United States as follows:

\_\_\_\_\_ (\$ \_\_\_\_\_.)

### **SUMMARY OF CONTRACT AWARD:**

<b>Base Bid:</b>	\$ _____.
<b>Alternate No.</b>	\$ _____.
<b>Total Contract Amount:</b>	\$ _____.

4. On or before the 20th day of each calendar month, the Party of the Second Part shall make payments to the Party of the First Part on the basis of a duly certified and approved estimate of work performed during the preceding calendar month by the First Party, less five percent (5%) of the amount of such estimate which is to be retained by the Second Party until all work has been performed strictly in accordance with this Agreement and until such work has been accepted by the Second Party. The Second Party may elect to waive retainage requirements after fifty percent (50%) of the work has been satisfactorily completed on schedule as referred to in Article 30 of the General Conditions.
5. Upon submission by the First Party of evidence, satisfactory to the Second Party that all payrolls, material bills and other costs incurred by the First Party in connection with the construction of the work has been paid in full, final payment on account of this Agreement shall be made within thirty (30) days after the completion by the First Party of all work covered by this Agreement and the acceptance of such work by the Second Party.
6. It is further mutually agreed between the parties hereto that if at any time after the execution of this Agreement and the Surety Bond hereto attached for its faithful performance, the Second Party shall deem the Surety or Sureties upon such Bond to be unsatisfactory, or if, for any reason, such Bond ceases to be adequate to cover the performance of the work, the First party shall at its expense, within five (5) days after the receipt of notice from the Second Party so to do, furnish an additional Bond or Bonds in such form and amount, and with such Surety or Sureties as shall be satisfactory to the Second Party. In such event no further payment to the First Party shall be deemed to be due under this Agreement until such new or additional security for the faithful performance of the work shall be furnished in manner and form satisfactory to the Second Party.

**LINCOLNTON EQUIPMENT SHOP**

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement on the day and date first above written in **five (5)** counterparts, each of which shall without proof or accounting for other counterparts, be deemed an original Contract.

**WITNESS:**

\_\_\_\_\_, **Inc.**  
Contractor: (Trade or Corporate Name)

\_\_\_\_\_  
(Proprietorship or Partnership) By: \_\_\_\_\_

**ATTEST:** (Corporation)

Title: \_\_\_\_\_  
(Owner, Partner, or Corporate President or Vice President only)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corporate Secretary or Assistant Secretary only)

(Corporate Seal)

The State of North Carolina Through the NC DEPARTMENT OF TRANSPORTATION  
(Agency, Department or Institution)

**WITNESS:**

\_\_\_\_\_  
By: \_\_\_\_\_  
Title: State Operations Engineer





**LINCOLNTON EQUIPMENT SHOP**

**PERFORMANCE BOND**

Date of Contract: \_\_\_\_\_ **2012**

Date of Execution: \_\_\_\_\_

Name of Principal: \_\_\_\_\_, Inc.  
(Contractor)

Name of Surety: \_\_\_\_\_  
\_\_\_\_\_

Name of Contracting Body: **The State of North Carolina Through the  
NC DEPARTMENT OF TRANSPORTATION**

Amount of Bond: \_\_\_\_\_ **dollars (\$\_\_\_\_\_.)**

Project: **LINCOLNTON EQUIPMENT SHOP**

KNOW ALL MEN BY THESE PRESENTS, that we, the 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, identified 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 modification 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-bounden 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.

Executed in five (5) Counterparts.

**LINCOLN TON EQUIPMENT SHOP**

**WITNESS:**

\_\_\_\_\_, Inc.  
Contractor: (Trade or Corporate Name)

\_\_\_\_\_  
(Proprietorship or Partnership) By: \_\_\_\_\_

**ATTEST:** (Corporation) Title: \_\_\_\_\_  
(Owner, Partner, or Corporate President or Vice President only)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corporate Secretary or Assistant Secretary only)

(Corporate Seal)

\_\_\_\_\_  
(Surety Company)

**WITNESS:** By: \_\_\_\_\_

\_\_\_\_\_  
Title: \_\_\_\_\_  
(Attorney in Fact)

**COUNTERSIGNED:**

\_\_\_\_\_  
(Surety Corporate Seal)

\_\_\_\_\_  
N.C. Licensed Resident Agent

\_\_\_\_\_  
\_\_\_\_\_  
Name and Address-Surety Agent

\_\_\_\_\_  
Surety Company Name and N.C. Regional or Branch Office

**LINCOLNTON EQUIPMENT SHOP**

**PAYMENT BOND**

Date of Contract: \_\_\_\_\_ **2012**

Date of Execution: \_\_\_\_\_

Name of Principal: \_\_\_\_\_, **Inc.**  
(Contractor) \_\_\_\_\_

Name of Surety: \_\_\_\_\_  
\_\_\_\_\_

Name of Contracting Body: **The State of North Carolina Through the  
NC DEPARTMENT OF TRANSPORTATION**

Amount of Bond: \_\_\_\_\_ **dollars (\$\_\_\_\_\_.)**

Project: **LINCOLNTON EQUIPMENT SHOP**

KNOW ALL MEN BY THESE PRESENTS, that we, the 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, identified as shown above and hereto attached:

NOW THEREFORE, if the principal shall promptly make payment to all persons supplying labor/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-bounden 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.

Executed in five (5) Counterparts.

**LINCOLN TON EQUIPMENT SHOP**

**WITNESS:**

\_\_\_\_\_, Inc.  
Contractor: (Trade or Corporate Name)

\_\_\_\_\_  
(Proprietorship or Partnership) By: \_\_\_\_\_

**ATTEST:** (Corporation)

Title: \_\_\_\_\_  
(Owner, Partner, or Corporate President or Vice President only)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corporate Secretary or Assistant Secretary only)

(Corporate Seal)

\_\_\_\_\_  
(Surety Company)

**WITNESS:**

By: \_\_\_\_\_

\_\_\_\_\_  
Title: \_\_\_\_\_  
(Attorney in Fact)

**COUNTERSIGNED:**

(Surety Corporate Seal)

\_\_\_\_\_  
N.C. Licensed Resident Agent

\_\_\_\_\_  
Name and Address-Surety Agent

\_\_\_\_\_  
Surety Company Name and N.C. Regional or Branch Office

**LINCOLN TON EQUIPMENT SHOP**

**POWER OF ATTORNEY**

(Attach Power of Attorney to this Page)



**LINCOLN TON EQUIPMENT SHOP**

**INSURANCE CERTIFICATES**

(Attach Insurance Certificates to this Page)





**LINCOLN TON EQUIPMENT SHOP**

**APPROVAL OF ATTORNEY GENERAL**

***CERTIFICATE BY THE OFFICE OF STATE BUDGET AND MANAGEMENT***

provision for the payment of money to fall due and payable by the \_\_\_\_\_  
\_\_\_\_\_ under this Agreement has  
been provided for by allocation made and is available for the purpose of  
carrying out this Agreement.

This \_\_\_\_\_ day of \_\_\_\_\_, 2012

Signed: \_\_\_\_\_  
Budget Officer

