

NCSU Project: **202220029**, SCO #: 22-25847-01A, Code/Item #: **42124/323**
Facility #: **129**

McKimmon Center Restroom Renovation

Project Manual

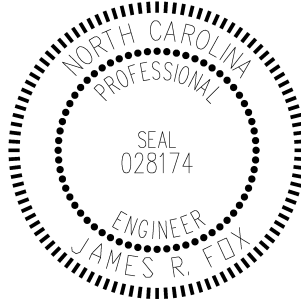
September 26, 2023 – Bid Documents

NORTH CAROLINA STATE UNIVERSITY
McKIMMON CENTER RESTROOM RENOVATION
RALEIGH, NORTH CAROLINA

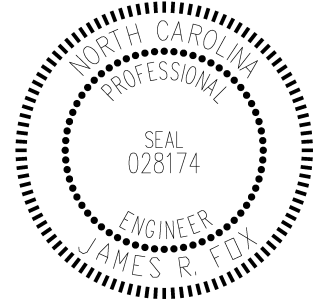
PROFESSIONAL SEALS



ARCHITECT



PLUMBING



MECHANICAL



FIRE ALARM



ELECTRICAL

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**Advertisement for Bids
&
Notice of Public Meeting for Proposed Alternate Bids for Preferred
Products**

Sealed proposals will be received by NC State University. **Attention Robert M. Cwikla, until 3:00 PM on December 12, 2023 in Conference Room 301**, Administrative Services III Building 2601 Wolf Village Way, Raleigh, NC 27695 and immediately thereafter publicly opened and read for the furnishing of labor, material and equipment for the construction of:

NC State University
McKimmon Center Restroom Renovations
SCO ID No.: 22-25847-01A
NC State Project No.: 202220029

The project is for alterations and renovation of restrooms in McKimmon Center on NC State's South Campus Precinct. The Scope of Work includes abatement, demolition and general construction, plumbing, HVAC, electrical and limited fire alarm.

Bids will be received for **single prime bid** contracts. All Proposals will be lump sum.

BID OPENING:

McKimmon Center Restroom Renovations
When: December 12, 2023 at 3:00 pm Eastern Time

The following General Contractors have been pre-qualified to bid this job:

BAR Construction, Greensboro, NC
Berry Building Group, Greenville, NC
CIC Construction Group, Durham, NC
EC Build, LLC, Raleigh, NC
I.L. Long Construction, Winston-Salem, NC
Leslie Construction Co., Raleigh, NC
McDonald York Building Co., Raleigh, NC
McKenna Construction, Morrisville, NC
Riggs-Harrod Builders, Durham, NC
Riley Contracting Group, Cary, NC
Salisbury & Moore Construction, Raleigh, NC
SAMET Corporation, Raleigh, NC

Bid documents are available for examination in the plan rooms:

1. iSQFT; <http://www.isqft.com/start/> handles Associated General Contractors plan room.
2. The local North Carolina offices of Dodge Data and Analytics;
3. The Eastern Regional Offices of CMD Group in Norcross, GA;
4. The offices of the Designer: Engineered Designs, Inc. (EDI);
5. The North Carolina Institute of Minority Economic Development, Inc. (NCIMED) Plan and Resource Center at 114 W. Parrish St., 6th Floor, Durham, NC; 919-956-8889 or 919-287-3036
6. The Hispanic Contractors Association of the Carolinas (HCAC) in Winston-Salem, Charlotte and Raleigh Areas – 877-227-1680;

Complete plans and specifications for this project in electronic format can be obtained from Tasha Hicks, at **Arcadis; 421 Fayetteville Street, Suite 1609, Raleigh, NC 27601 during normal office hours after 10/20/23**. Email requests for the electronic documents may be sent to

[\\wolftech.ad.ncsu.edu/oit/Shares/CAPMGMT/Procedures/5 Bidding & Award/5.1 Forms](http://wolftech.ad.ncsu.edu/oit/Shares/CAPMGMT/Procedures/5 Bidding & Award/5.1 Forms)

Rev. 1-12-22

tasha.hicks@arcadis.com. Complete printed copies may be obtained by those qualified as prime bidders, upon deposit of two hundred dollars, (\$200) in cash or certified check with a minimum of 48 hours notice to tasha.hicks@arcadis.com. The full plan deposit will be returned to those bidders provided all documents are returned in BOUND, good usable condition within ten (10) days after the bid date.

Complete or partial printed copies of the project documents can be directly purchased from Document Imaging Systems, Inc at 231 East Johnson Street, Units E, F, & G, Cary, NC 27513. Phone number for ordering is 919-460-9440. Complete or partial sets shall be purchased at contractor's expense and will not be refunded.

The State reserves the unqualified right to reject any and all proposals.

North Carolina State University has an affirmative policy of fostering, promoting and conducting business with minority owned enterprises. Minority contractors are encouraged to participate in the bidding process.

The bidder must include completed minority business subcontractor documentation form(s) with their proposal or the bid may be considered non-responsive and invalid.

Pre-Bid Meeting

McKimmon Center Restroom Renovations

When: November 7, 2023 at 10:00 am Eastern Time

A Pre-bid meeting will be held for all prequalified bidders in Room 301 of Administrative Services III Building at 2601 Wolf Village Way, Raleigh, NC 27695. The meeting will address project specific questions. Attendance is highly recommended but not mandatory.

Notice of Public Meeting for Proposed Alternate Bids for Preferred Products.

McKimmon Center Restroom Renovations

When: November 7, 2023, at 10:00 am Eastern Time

An open public meeting will be held in Room 301 of Administrative Services III Building at 2601 Wolf Village Way, Raleigh, NC 27695. The meeting is to identify preferred brand alternates and their performance standards pertinent to this project.

In accordance with GS133-3, Section 64. (C) and State Construction Office procedures the following preferred brand items are being considered as Alternates by the owner for this project: Door hardware (automatic operators and closers) and toilet and bath accessories. A copy of pertinent sections of the performance standards may be obtained by contacting the designer at the address or phone number noted above.

Robert M. Cwikla
NC State University
Capital Project Management
rmcwikla@ncsu.edu
919.949.1553

NOTICE TO BIDDERS

Sealed proposals will be received by the North Carolina State University in Raleigh, NC, Attention Mr. Bob Cwikla in **conference room 301**, Administrative Services III Building 2701 Sullivan Drive, Raleigh, NC 27695 up to **3:00 pm Thursday, December 12, 2023** and immediately thereafter publicly opened and read for the furnishing of labor, material and equipment entering into the construction of

North Carolina State University
McKimmon Center Restroom Renovation
SCO #19-21179-01A
NC State # 20190031

The project is for the alteration and renovation of restrooms in the McKimmon Center on NC State's South Campus Precinct. The Scope of Work includes abatement, demolition, and general construction, plumbing, HVAC, electrical, and limited fire alarm.

Bids will be received for **single prime** contracts. All proposals shall be lump sum.

The following General Contractors have been pre-qualified to bid this job:

1. Bar Construction, Greensboro NC
2. Berry Building Group., Greenville NC
3. CIC Construction Group, Durham NC
4. ECBuild, LLC, Raleigh, NC
5. I.L. Long Construction, Winston-Salem, NC
6. Leslie Construction Co, Raleigh NC
7. McDonald York Building Co, Raleigh NC
8. McKenna Construction, Morrisville, NC
9. Riggs-Harrod Builders, Durham NC
10. Riley Contracting Group, Cary, NC
11. Salisbury & Moore Construction, Raleigh NC
12. SAMET Corporation, Raleigh NC

Pre-Bid Meeting

A **Mandatory** Pre-bid meeting and site visit will be held for all interested bidders on **November 7, 2023, 10:00am in room 301** of Administrative Services III, 2701 Sullivan Drive, Raleigh, NC 27695. **ATTENDANCE AT THE PRE-BID MEETING IS MANDATORY.** The meeting will address project specific questions and provide an opportunity for bidders to assess the project's existing conditions.

Notice of Public Meeting for Proposed Alternate Bids for Preferred Products.

An open public meeting will be held at **11:30am on November 7, 2023 in Room 301 of** Administrative Services III Building at 2701 Sullivan Drive, Raleigh, NC 27695. The meeting is to identify preferred brand alternates and their performance standards pertinent to this project.

In accordance with General Statute GS 133-3, Specifications may list one or more preferred brands as an alternate to the base bid in limited circumstances. Specifications containing a preferred brand alternate under this section must identify the performance standards that support the preference. Performance standards for the preference must be approved in advance by the owner in an open meeting. Any alternate approved by the owner shall be approved only where (i) the preferred alternate will provide cost savings, maintain or improve the functioning of any process or system affected by the preferred item or items, or both, and (ii) a justification identifying these criteria is made available in writing to the public.

In accordance with GS133-3 and SCO procedures the following preferred brand items are being considered as Alternates by the owner for this project:

- A. Door Closers - LCN
- B. Door Automatic Operators – LCN
- G. Toilet Accessories, Napkin Dispenser & Disposal - Bobrick
- H. Baby Changing Station - Koala Kare

Justification of any approvals will be made available to the public in writing no later than seven (7) days prior to bid date.

Complete plans, specifications and contract documents will be open for inspection during normal office hours in the North Carolina State University Plan Room 324, Administrative Services III Building 2701 Sullivan Drive, Raleigh, NC 27695 and in the office of Arcadis at 421 Fayetteville Street, Suite 1609 Raleigh, NC 27601, and in the following plan rooms:

1. iSQFT; <http://www.isqft.com/start/> handles Associated General Contractors plan room.
2. The local North Carolina offices of Dodge Data and Analytics;
3. The Eastern Regional Offices of CMD Group in Norcross, GA;
4. The North Carolina Institute of Minority Economic Development, Inc. (NCIMED) Plan and Resource Center at 114 W. Parrish St., 6th Floor, Durham, NC; 919-956-8889 or 919-287-3036;
5. The Hispanic Contractors Association of the Carolinas (HCAC) in Winston-Salem, Charlotte and Raleigh Areas – 877-227-1680;

Complete electronic files of the plans and specifications may be obtained by the prequalified prime bidders beginning **October 20, 2023**. Requests for electronic documentation may be sent to Tasha Hicks at tasha.hicks@arcadis.com.

Complete printed copies of the plans and specifications may be obtained by the prequalified prime bidders beginning **October 20, 2023** upon deposit of two hundred dollars (\$200) in cash or certified check payable to Arcadis. Requests for printed copies may be sent to Tasha Hicks at tasha.hicks@arcadis.com with a minimum of 48 hours notice. The full plan deposit will be returned to those bidders provided all documents are returned bound, in good, usable condition within ten (10) days after the bid date.

Complete or partial printed sets of plans and specifications can be directly purchased from **Document Imaging Systems, Inc. at 231 East Johnson Street, Units E, F, & G, Cary, NC 27513. Phone number for ordering is 919-460-9440.** Complete or partial sets shall be purchased at contractor's expense and will not be refunded.

NOTE: The bidder shall include with the bid proposal the form *Identification of Minority Business Participation* identifying the minority business participation it will use on the project 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 Contractor, Unlimited.

NOTE--SINGLE PRIME CONTRACTS: Under GS 87-1, a contractor that superintends or manages construction of any building, highway, public utility, grading, structure or improvement shall be deemed a "general contractor" and shall be so licensed. Therefore a single prime project that involves other trades will
SCO-Notice To Bidders 2010 (Updated Dec. 2010)

require the single prime contractor to hold a proper General Contractors license. **EXCEPT:** On public buildings being bid single prime, where the total value of the general construction does not exceed 25% of the total construction value, contractors under GS87- Arts 2 and 4 (Plumbing, Mechanical & Electrical) may bid and contract directly with the Owner as the SINGLE PRIME CONTRACTOR and may subcontract to other properly licensed trades. [GS87-1.1- Rules .0210](#)

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:
Arcadis
(Name)

421 Fayetteville Street, Ste 1609
Raleigh, NC 27601
(Address)

(919) 851-4211
(Phone)

Owner:
North Carolina State University
(Agency/Institution)

2701 Sullivan Drive, Ste 331
Raleigh, NC 27695-7520

(919) 515-6836

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**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 Fourth Edition January 2013

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 proposer shall so indicate by the words "No Bid". Any blanks shall also be interpreted as "No Bid". 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. If figures and writing differ, the written number will supersede the figures.

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 should be addressed as indicated in the Advertisement for Bids and 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 should 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 any delivery service, shall disqualify the bid.

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 should be acknowledged by the bidder(s) on the Form of Proposal. However, even if not acknowledged, by submitting a bid, the bidder has certified that he has reviewed all issued addenda and has included all costs associated within his bid.

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 and shall be used.

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 the closing of the bid, 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 bidding is closed, 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 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.
- g. If prequalified, contractor info will be reviewed and evaluated comparatively to submitted prequalification package.

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) shall 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 consequential damages associated with the Owner's economic loss in not being able to use the Project for its intended purposes at the end of the contract's completion date as amended by change order, if any, by reason of failure of the contractor(s) to complete the work within the time specified. Liquidated damages does not include the Owner's extended contract administration costs (including but not limited to additional fees for architectural and engineering services, testing services, inspection services, commissioning services, etc.), such other damages directly resulting from delays caused solely by the contractor, or consequential damages that the Owner identified in the bid documents that may be impacted by any delay caused solely by the Contractor (e.g., if a multi-phased project-subsequent phases, delays in start other projects that are dependent on the completion of this Project, extension of leases and/or maintenance agreements for other facilities).
- 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. Acceptance of equal is subject to approval of Designer and owner.
- 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. Acceptance of substitution is subject to the approval of the Designer and owner.

- u. **Provide** shall mean furnish and install complete in place, new, clean, operational, and ready for use.
- v. **Indicated and shown** shall mean provide as detailed, or called for, and reasonably implied in the contract documents.
- w. **Special inspector** is one who inspects materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with the approved construction documents and referenced standards.
- x. **Commissioning** is a quality assurance process that verifies and documents that building components and systems operate in accordance to the owner's project requirements and the project design documents.
- y. **Designer Final Inspection** is the inspection performed by the design team to determine the completeness of the project in accordance with approved plans and specifications. This inspection occurs prior to SCO final inspection.
- z. **SCO Final Inspection** is the inspection performed by the State Construction Office to determine the completeness of the project in accordance with NC Building Codes and approved plans and specifications.
- aa. **Beneficial Occupancy** is requested by the owner and is occupancy or partial occupancy of the building after all life safety items have been completed as determined by the State Construction Office. Life safety items include but not limited to fire alarm, sprinkler, egress and exit lighting, fire rated walls, egress paths and security.
- bb. Final Acceptance is the date in which the State Construction Office accepts the construction as totally complete. This includes the SCO Final Inspection and certification by the designer that all punch lists are completed.

ARTICLE 2 - INTENT AND EXECUTION OF DOCUMENTS

- a. The drawings and specifications are complementary, one to the other, and 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 bid for 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. The date of performance and payment bond shall not be prior to the date of 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 or Owner shall furnish free of charge to the contractors electronic copies of plans and specifications. If requested by the contractor, paper copies of plans and specifications shall be furnished free of charge 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 15 consecutive calendar days after the notice to proceed, each prime contractor shall submit a schedule for submission of all shop drawings, product data, samples, and similar submittals through the Project Expediter to 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(s) shall review, approve and submit to the Designer all Shop Drawings, Coordination 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 in accordance with the schedule submitted in paragraph (a). 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 (1 for the Designer, 1 for the owner and 1 for SCO) 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/submittals 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, his authorized representative, owner or State Construction Office.

- 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 final acceptance of the project.
- c. The contractor shall maintain at the job office a record of all required tests that have been performed, clearly indicating the scope of work inspected and the date of approval or rejection.

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. Alternate materials may be requested after the award if it can clearly be demonstrated that it is an added benefit to the owner and the designer and owner approves.
- e. 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 language, conduct, or attire 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 and included within the bid proposal. All water taps, meter barrels, vaults and impact fees shall be paid by the contractor unless otherwise noted.
- d. 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.
- e. Projects involving local funding (community colleges) are subject also 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 and owner.
- 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 person of his organization as safety officer/inspector to inspect the project site for unsafe health and safety hazards, to report these hazards to the contractor for correction, and whose duties also include accident prevention on the project, and to provide other safety and health measures on the project site as required by the terms and conditions of the contract. The name of the safety inspector shall be made known to the designer and owner at the time of the preconstruction conference and in all cases prior to any work starting on the project.
- 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).

- i. Any and all costs associated with correcting damage caused to adjacent properties of the construction site or staging area shall be borne by the contractor. These costs shall include but not be limited to flooding, mud, sand, stone, debris, and discharging of waste products.

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 and during any time work is in preparation and progress by the designer, designated official representatives of the owner, State Construction Office 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. All work shall be inspected by designer, special inspector and/or State Construction Office prior to being covered by the contractor. Contractor shall give a minimum two weeks notice unless otherwise agreed to by all parties. If inspection fails, after the first reinspection all costs associated with additional reinspections shall be borne by the contractor.

- d. 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.
- e. 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.
- f. Should any work be covered up or concealed prior to inspection and approval by the designer, special inspector, and/or State Construction Office such work shall be uncovered or exposed for inspection, if so requested by the designer in writing. Inspection of the work will be made 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.

ARTICLE 14 - CONSTRUCTION SUPERVISION AND SCHEDULE

- a. Throughout the progress of the work, each contractor shall keep at the job site, a competent superintendent and supervisory staff satisfactory to the designer and the owner. The superintendent and supervisory staff shall not be changed without the consent of the designer and owner unless said superintendent ceases to be employed by the contractor or ceases to be competent as determined by the contractor, designer or owner. The superintendent and other staff designated by the contractor in writing 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 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. The contractor shall turn over a copy of his daily reports to the Designer and Owner at the job site progress conference. Owner will determine daily report format.

- e. The contractor(s) shall, 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 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 at a minimum 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 \$500,000 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 \$500,000, 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 commissioning, required inspections and completion of final punchlist(s). 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 commissioning, required inspections and completion of final punchlist(s).. 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 fifteen (15) days after written notice to proceed. No application for payment will be processed until this schedule is accepted by the designer and 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 biweekly 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 biweekly report of the status of all activities. The bar chart schedule or 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 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, as determined by the Designer, 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. The project expeditor's Superintendent(s) shall be in attendance at the Project site at all times when work is in progress unless conditions are beyond the control of the Contractor or until termination of the Contract in accordance with the Contract Documents. It is understood that such Superintendent shall be acceptable to the Owner and Designer and shall be the one who will be continued in that capacity for the duration of the project unless he ceases to be on the Contractor's payroll or the Owner otherwise agrees. The Superintendent shall not be employed on any other project for or by the Contractor or by any other entity during the course of the Work. If the Superintendent is employed by the Contractor on another project without the Owner's approval, then the Owner may deduct from the Contractor's monthly general condition costs and amount representing the Superintendent's cost and shall deduct that amount for each month thereafter until the Contractor has the Superintendent back on the Owner's Project full-time.

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 delivered by the following delivery methods: 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 and 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, owner 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 or owner, the designer or owner 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 or owner's recommendation, the contractor shall submit a substitute for approval. The designer and owner 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 or owner.
- 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 45 day 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 direct work to be performed, to stop work, to order work removed, or to order corrections of faulty work, where any such action by the designer 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 and his consultants will make inspections of the project. 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 and owner may perform their 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, electronically, or hand delivered, may be used where the change involved impacts the critical path of the work. A formal change order shall be issued as expeditiously as possible.

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 specified by the designer or owner, 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, or subsequently agreed to by the Contractor, Designer, Owner and State Construction Office 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 be as follows: all contractors (the single contracting entity (prime), his subcontractors(1st tier subs), or their sub-subcontractors (2nd tier subs, 3rd tier subs, etc)) shall be allowed a maximum of 10% on work they each self-perform; the prime contractor shall be allowed a maximum of 5% on contracted work of his 1st tier sub; 1st tier, 2nd tier, 3rd tier, etc contractors shall be allowed a maximum of 2.5% on the contracted work of their subs. ; 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 work;
 2. The actual costs of labor expended on the project site; labor expended in coordination, change order negotiation, record document maintenance, shop drawing revision or other tasks necessary to the administration of the project are considered overhead whether they take place in an office or 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 thirty percent (30%) 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 work;
 5. The actual costs of premiums for bonds, insurance, permit fees, and sales or use taxes related to the work.

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 unit cost 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. Delay in the processing of the change order due to lack of proper submittal by the contractor of all required supporting data shall not constitute grounds for a time extension or basis of a claim. Within fourteen (14) days after receipt of the contractor's accepted proposal including all supporting documentation required by the designer, 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. 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 whereupon the contractor shall proceed and keep accurately on such form as specified by the Designer or owner, a correct account of cost together with all proper invoices, payrolls and supporting data. Upon completion of the work a change order will be prepared with allowances for overhead and profit per paragraph d. above and "net cost" and "cost" per paragraph e. 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 instructions given 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. The written notice shall clearly state that a claim for extra cost is being made and shall provide a detailed justification for the extra cost. The contractor 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 shall 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 shall 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 that complies with the requirements of (a) above by the contractor and is 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 (1 N.C.A.C. 30H .0101 through .1001). 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, or G.S. 143-135.6 where Community Colleges are the owner, 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 contractors 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. Time is of the essence and the contractor acknowledges the Owner will likely suffer financial damage for failure to complete the work within the time of completion. 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. In the event of multiple prime contractors, 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 solely by any act or negligence of the owner, 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 only 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. No weather delays shall be considered after the building is dried in unless work claimed to be delayed is on the critical path of the baseline schedule or approved updated schedule. Time extensions for weather delays, acts of God, labor disputes, fire, delays in transportation, unavoidable casualties or other delays which are beyond the control of the Owner do not entitle the Contractor to compensable damages for delays. Any contractor claim for compensable damages for delays is limited to delays caused solely by the owner or its agents. Contractor caused delays shall be accounted for before owner or designer caused delays in the case of concurrent delays.

- e. Request for extension of time shall be made in writing to the designer, copies to the owner and SCO, within twenty (20) days following cause of delay. In case of continuing cause for delay, the Contractor shall notify the Designer to the designer, copies to the owner and SCO, 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 for time extension 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. Demand must be in written form clearly stating the potential for delay unless the drawings or instructions are provided. Any delay granted will begin after the twenty (20) day demand period is concluded.

ARTICLE 24 - PARTIAL UTILIZATION/BENEFICIAL OCCUPANCY

- a. The owner may desire to occupy or utilize all or a portion of the project prior to the completion of the project.
- b. Should the owner request a utilization of a building or portion thereof, the designer shall perform a designer final inspection of area after being notified by the contractor that the area is ready for such. After the contractor has completed designer final inspection punch list and the designer has verified, then the designer shall schedule a beneficial occupancy inspection at a time and date acceptable to the owner, contractor(s) and State Construction Office. If beneficial occupancy is granted by the State Construction Office, in such areas the following will be established:
 - 1. The beginning of guarantees and warranties period for the equipment necessary to support. in the area.
 - 2. The owner assumes all responsibilities for utility costs for entire building.
 - 2. Contractor will obtain consent of surety.
 - 3. Contractor will obtain endorsement from insurance company permitting beneficial 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 Designer final inspection to verify that the project is complete and ready for SCO final inspection. Prior to SCO final inspection, the contractor(s) shall complete all items requiring corrective measures noted at the Designer

final inspection. The designer shall schedule a SCO final inspection at a time and date acceptable to the owner, contractor(s) and State Construction Office.

- b. At the SCO final inspection, the designer and his consultants 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 SCO final inspection, the designer and State Construction Office representative shall make one of the following determinations:
 - 1. That the project is completed and accepted.
 - 2. That the project will be accepted subject to the correction of the list of discrepancies (punch list). All punch list items must be completed within thirty (30) days of SCO final inspection or the owner may invoke Article 28, Owner's Right to Do Work.
 - 4. That the project is not complete and another date for a SCO final inspection will be established.
- c. Within fourteen (14) days of final acceptance per Paragraph b1 or within fourteen (14) days after completion of punch list per Paragraph b2 above, the designer shall certify the work and issue applicable certificate(s) of compliance.
- d. Any discrepancies listed or discovered after the date of SCO final inspection and acceptance under Paragraphs b1 or b2 above shall be handled in accordance with Article 42, Guarantee.
- f. The final acceptance date 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.
- g. Prior to issuance of final acceptance date, the contractor shall have his authorized representatives visit the project and give full instructions to the designated personnel regarding operating, maintenance, care, and adjustment of all equipment and special construction elements. In addition, the contractor shall provide to the owner a complete instructional video (media format acceptable to the owner) on the operation, maintenance, care and adjustment of all equipment and special construction elements.**

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, as determined by the designer, 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. Contractor shall correct or make good any defects due thereto and repair any damage resulting there from, 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 seven (7) 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 seven (7) 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 seven (7) 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 forty-five (45) 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 10 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. Such payments will be made only for materials that have been customized or fabricated specifically for this project. Raw materials or commodity products including but not limited to piping, conduit, CMU, metal studs and gypsum board may not be submitted. 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 an independent, licensed, bonded warehouse approved by the designer, owner 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, owner and SCO 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.
 5. Granting access to Contractor’s records, if Owner’s internal auditors have made a request for such access pursuant to Article 52.
- 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 contract amounts and total actual payments to subs and material suppliers.
 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. The Owner may withhold all or a portion of Contractor's general conditions costs set forth in the approved schedule of values, if Contractor has failed to comply with: (1) a request to access its records by Owner's internal auditors pursuant to Article 52; (2) a request for a plan of action and/or recovery schedule under Article 14.j or provide The Owner; (3) a request to provide an electronic copies of Contractor's baseline schedule, updates with all logic used to create the schedules in the original format of the scheduling software; and (4) Contractor's failure to have its Superintendent on the Project full-time; (
 - d. 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 in accordance with G.S. 143-134.1. As provided in G.S.143-134.1(e) the owner shall not be liable for interest on payments withheld by the owner for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the owner or reasonable evidence that a third-party claim will be filed.

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 document 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. If endorsements are needed to comply with the notification or other requirements of this article copies of the endorsements shall be submitted with the certificates.

a. Worker's Compensation and Employer's Liability

The contractor shall provide and maintain, until final acceptance, 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, until final acceptance, 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 until final acceptance, 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 sub-subcontractors in the work and shall insure against the perils of fire, wind, rain, flood, 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.
- 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 owner 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 and owner'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 contractor shall provide necessary and adequate facilities for water, electricity, gas, oil, sewer and other utility services which maybe necessary and required for completion of the project including all utilities required for testing, cleaning, balancing, and sterilization of designated plumbing, mechanical and electrical systems. Any permanent meters installed shall be listed in the contractor's name until work has a final acceptance. The contractor will be solely responsible for all utility costs prior to final acceptance. Contractor shall contact all affected utility companies prior to bid to determine their requirements to provide temporary and permanent service and include all costs associated with providing those services in their bid. Coordination of the work of the utility companies during construction is the sole responsibility of the contractor.

- b. Meters shall be relisted in the owner's name on the day following final 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), the designer and owner. Use of the equipment in this manner shall be subject to the approval of the Designer and owner and 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 final acceptance of work by the State Construction Office, each contractor shall remove and replace any parts of the permanent building systems damaged through use during construction.
 - 2. Temporary filters as recommended by the equipment manufacturer in order to keep the equipment and ductwork clean and free of dust and debris 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 there from, 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 INDIVIDUALS WITH DISABILITIES

The contractor(s) agree not to discriminate against any employee or applicant for employment because of physical or mental disabilities 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 individuals with such disabilities without discrimination based upon their physical or mental disability 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.

ARTICLE 51 – GIFTS

Pursuant to N.C. Gen. Stat. § 133-32, it is unlawful for any vendor or contractor (i.e. architect, bidder, contractor, construction manager, design professional, engineer, subcontractor, supplier, vendor, etc.), to make gifts or to give favors to any State employee. This prohibition covers those vendors and contractors who: (1) have a contract with a governmental agency; or (2) have performed under such a contract within the past year; or (3) anticipate bidding on such a contract in the future. For additional information regarding the specific requirements and exemptions, vendors and contractors are encouraged to review G.S. Sec. 133-32.

During the construction of the Project, the Contractor is prohibited from making gifts to any of the Owner's employees, Owner's project representatives (architect, engineers, construction manager and their employees), employees of the State Construction Office and/or any other State employee that may have any involvement, influence, responsibilities, oversight, management and/or duties that pertain to and/or relate to the contract administration, financial administration and/or disposition of claims arising from and/or relating to the Contract and/or Project.

ARTICLE 52 – AUDITING-ACCESS TO PERSONS AND RECORDS

In accordance with N.C. General Statute 147-64.7, the State Auditor shall have access to Contractor's officers, employees, agents and/or other persons in control of and/or responsible for the Contractor's records that relate to this Contracts for purposes of conducting audits under the referenced statute. The Owner's internal auditors shall also have the right to access and copy the Contractor's records relating to the Contract and Project during the term of the Contract and within two years following the completion of the Project/close-out of the Contract to verify accounts, accuracy, information, calculations and/or data affecting and/or

relating to Contractor's requests for payment, requests for change orders, change orders, claims for extra work, requests for time extensions and related claims for delay/extended general conditions costs, claims for lost productivity, claims for loss efficiency, claims for idle equipment or labor, claims for price/cost escalation, pass-through claims of subcontractors and/or suppliers, and/or any other type of claim for payment or damages from Owner and/or its project representatives.

ARTICLE 53 – NORTH CAROLINA FALSE CLAIMS ACT

The North Carolina False Claims Act ("NCFCA"), N.C. Gen. Stat. § 1-605 through 1-618, applies to this Contract. The Contractor should familiarize itself with the entire NCFCA and should seek the assistance of an attorney if it has any questions regarding the NCFCA and its applicability to any requests, demands and/or claims for payment its submits to the State through the contracting state agency, institution, university or community college.

The purpose of the NCFCA "is to deter persons from knowingly causing or assisting in causing the State to pay claims that are false or fraudulent and to provide remedies in the form of treble damages and civil penalties when money is obtained from the State by reason of a false or fraudulent claim." (Section 1-605(b).) A contractor's liability under the NCFCA may arise from, but is not limited to: requests for payment, invoices, billing, claims for extra work, requests for change orders, requests for time extensions, claims for delay damages/extended general conditions costs, claims for lost productivity, claims for loss efficiency, claims for idle equipment or labor, claims for price/cost escalation, pass-through claims of subcontractors and/or suppliers, documentation used to support any of the foregoing requests or claims, and/or any other request for payment from the State through the contracting state agency, institution, university or community college. The parts of the NCFCA that are most likely to be enforced with respect to this type of contract are as follows:

- A "claim" is "[a]ny request or demand, whether under a contract or otherwise, for money or property and whether or not the State has title to the money or property that (i) is presented to an officer, employee, or agent of the State or (ii) is made to a contractor ... if the money or property is to be spent or used on the State's behalf or to advance a State program or interest and if the State government: (a) provides or has provided any portion of the money or property that is requested or demanded; or (b) will reimburse such contractor ... for any portion of the money or property which is requested or demanded." (Section 1-606(2).)
- "Knowing" and "knowingly." – Whenever a person, with respect to information, does any of the following: (a) Has actual knowledge of the information; (b) Acts in deliberate ignorance of the truth or falsity of the information; and/or (c) Acts in reckless disregard of the truth or falsity of the information. (Section 1-606(4).) Proof of specific intent to defraud is not required. (Section 1-606(4).)
- "Material" means having a natural tendency to influence, or be capable of influencing, the payment or receipt of money or property. (Section 1-606(4).)
- Liability. – "Any person who commits any of the following acts shall be liable to the State for three times the amount of damages that the State sustains because of the act of that person[:]. ... (1) Knowingly presents or causes to be presented a false or fraudulent claim for payment or approval. (2) Knowingly makes, uses, or causes to be made or used, a false record or statement material to a false or fraudulent claim. (3) Conspires to commit a violation of subdivision (1), (2) ..." (Section 1-607(a)(1), (2).)

- The NCFCA shall be interpreted and construed so as to be consistent with the federal False Claims Act, 31 U.S.C. § 3729, et seq., and any subsequent amendments to that act. (Section 1-616(c).)

Finally, the contracting state agency, institution, university or community college may refer any suspected violation of the NCFCA by the Contractor to the Attorney General's Office for investigation. Under Section 1-608(a), the Attorney General is responsible for investigating any violation of NCFCA, and may bring a civil action against the Contractor under the NCFCA. The Attorney General's investigation and any civil action relating thereto are independent and not subject to any dispute resolution provision set forth in this Contract. (See Section 1-608(a).)

ARTICLE 54 – TERMINATION FOR CONVENIENCE

Owner may at any time and for any reason terminate Contractor's services and work at Owner's convenience. Upon receipt of such notice, Contractor shall, unless the notice directs otherwise, immediately discontinue the work and placing of orders for materials, facilities and supplies in connection with the performance of this Agreement.

Upon such termination, Contractor shall be entitled to payment only as follows: (1) the actual cost of the work completed in conformity with this Agreement; plus, (2) such other costs actually incurred by Contractor as are permitted by the prime contract and approved by Owner; (3) plus ten percent (10%) of the cost of the work referred to in subparagraph (1) above for overhead and profit. There shall be deducted from such sums as provided in this subparagraph the amount of any payments made to Contractor prior to the date of the termination of this Agreement. Contractor shall not be entitled to any claim or claim of lien against Owner for any additional compensation or damages in the event of such termination and payment.

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**SUPPLEMENTARY GENERAL CONDITIONS
(SGC's) OF THE CONTRACT**

**STANDARD FORM FOR CONSTRUCTION
CONTRACTS**

**NORTH CAROLINA STATE
UNIVERSITY**

NC State University Design and Construction Guidelines

Supplementary General Conditions

SUPPLEMENTARY GENERAL CONDITIONS (SGC's) OF THE CONTRACT

The use or reproduction of this document or any part thereof is authorized for and limited to use on projects of North Carolina State University, and is distributed by, through and at the discretion of the University for that distinct and sole purpose. This document supplements but does not alter in any way the requirements of the General Conditions of the Contract.

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NC State University Design and Construction Guidelines

Supplementary General Conditions

1.0 SGC Article 1 – Definitions

- A. As defined in Article 1 of the General Conditions, the Supplementary General Conditions are considered part of the contract documents.
- B. The Owner is the State of North Carolina through North Carolina State University.
- C. Provide shall mean purchase, deliver, and install, new, clean, and completely operational, fully tested and ready for use.

2.0 SGC Article 14 – Construction Supervision and Schedule

- A. The contractor(s) shall employ an engineer or a land surveyor licensed in the State of North Carolina to lay out the work and to establish a benchmark nearby in a location where same will not be disturbed and where direct instruments sights may be taken.
- B. The designer shall designate a Project Expediter on projects involving two or more prime contracts. The Project Expediter shall be the General Contractor unless determined otherwise by the designer. The Project Expediter shall have the responsibilities described in Article 14.f. of the General Conditions.
- C. Project Construction Schedule. North Carolina State University requires a CPM schedule for all projects, regardless of size and/or dollar amount. Bar Chart schedules may be allowed on a case-by-case basis. All CPM schedules shall meet the requirements of the General Conditions as well as the following:
 - 1. The CPM Baseline Schedule or Updated Schedule shall consist of the computer files on electronic media necessary to recreate the schedule. Files shall consist of four discrete items:
 - a) The Activity description including the original and remaining durations, and percent complete. Show other computed information such as early and late computed start and finish times and various types of floats.
 - b) The logical predecessor and successor relationships that connect the various activities together to form a CPM network. All activities shall be linked with no constraints placed on any activity unless critical milestone dates are dictated in the contract.
 - c) Constraints listing if any must exist.
 - d) All hidden codes or constraints assigned to activities by the Scheduler, which help define the intended workflow or project organization.
 - 2. Each schedule submittal shall include a cover letter, a narrative, a hard copy of the schedule and the schedule files on electronic media. The schedule update narrative should state what activity changes happened on the project, including missing data, upcoming changes, documented delays, potential delays and other facts.

NC State University Design and Construction Guidelines

Supplementary General Conditions

3. Contractors and subcontractors shall include a minimum of five (5) full days in their base bid for their project superintendent and project manager to attend a preliminary scheduling meeting with the project expediter. Each contractor shall attend additional scheduling meetings as required until an acceptable construction schedule conforming to the contract time is completed and approved via signing of the printed schedule by the single or each prime contractor (project manager and superintendent). Copies of the signed schedule shall be given to the Designer, Owner and each signatory; the original shall be displayed at the jobsite. The submitted schedule shall show the contract project completion date.
4. The schedule shall be updated monthly or at the Designer and/or Owner's request. The project expediter shall make all updates, adjustments, corrections, etc., with input provided from the other prime or subcontractors. It will be the responsibility of each prime and/or subcontractor to either agree or disagree with the updated schedule via signing and dating the schedule submitted by the project expediter or providing a written summary of schedule exceptions and/or inaccuracies.
5. Project expediter is required to provide an updated construction schedule with each monthly payment application. It will be the responsibility of each prime and/or subcontractor to either agree or disagree with the updated schedule via signing and dating the schedule submitted by the project expediter or providing a written summary of schedule exceptions and/or inaccuracies. Payment requests received without one or the other of the above will be considered incomplete and will be returned as being incomplete. The only contractor required to submit a copy of the updated progress schedule with his monthly payment application is the project expediter.
6. A completion or finish schedule is required at 80% project completion, illustrating tasks remaining to complete the project. The designer and Owner are required to approve finish schedule.
7. Project expediter shall include all relevant testing and inspections on the CPM schedule, including but not limited to: telecom/data wiring tests and as-built drawings, fire alarm system testing, fire suppression system testing, piping pressure testing, all applicable NFPA, DOI, DOL tests and commissioning activities.
8. The Contractor will schedule as Milestones in the CPM schedule and ensure they are met the following activities: MEPFP Coordination drawings, Casework and Fume Hood Submittals and shop drawings shall be submitted to the design team for review NO LATER than 30 days after the Notice To Proceed.

3.0 SGC Article 23 - Time Of Completion, Delays, Extension of Time

- A. For each day in excess of the above number of days, the contractor(s) shall pay the owner liquidated damages in the amount of \$_____ per consecutive calendar day. [Designer and Owner to jointly determine amount of LD's based on specific project requirements.]

NC State University Design and Construction Guidelines

Supplementary General Conditions

This project does not include Commissioning
B. The time of completion for this project is _____ consecutive calendar days and begins on the date stated in the Designer's Notice to Proceed letter issued to the contractor.

This project includes Commissioning
B. The time of completion to SUBSTANTIAL COMPLETION for this project is _____ consecutive calendar days and begins on the date stated in the Designer's Notice to Proceed letter issued to the contractor. SUBSTANTIAL COMPLETION for this project is defined as the General Contractor and its subcontractors having completed the following:

1. GC's Pre-Final Punch List
2. Testing Adjusting and Balancing (TAB) is complete per the project specifications.
3. Pre-Functional Testing shall be complete and the completed report shall be issued to the design team prior to SUBSTANTIAL COMPLETION.

For a period not to exceed _____ weeks following immediately after SUBSTANTIAL COMPLETION, the Owner's agents will perform Enhanced Start UP of MEP systems and punch list generation and back punch activities. The contractor will be responsible for assisting in all testing and punch activities including the completion of all adjusting, balancing, repairing, correcting, replacing and completing unacceptable or otherwise incomplete work identified by the design team.

4.0 SGC Article 40 – Utilities, Structures, Signs

- A. UTILITIES FOR NEW BUILDINGS - The Project Expediter will make arrangements with the appropriate utility service providers to provide temporary utilities to the site. The Project Expediter shall bear the costs of providing all temporary utilities to the site and all charges for temporary utilities during the project duration.
- B. UTILITIES FOR EXISTING BUILDINGS – The Project Expediter will make arrangements with either the appropriate utility service providers or with NCSU (if the existing building is already metered) to provide temporary utilities to the site. The University will bear the cost of all temporary utilities except the use of supplemental generators for power. The contractor may use what is available on site without affecting the ongoing operations of the Owner in any way, but may not request additional services that are not already present. Anything additional required by the contractor will be procured and paid for by the contractor

Electricity: \$ _____/KWH (kilo-watt hour)

Water: \$ _____/CCS (hundred cubic feet)

Steam: \$ _____/thousand pounds

Natural gas: \$ _____/deca-therm

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APPENDIX A

GUIDELINES FOR MINORITY BUSINESS PARTICIPATION

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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

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.

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APPENDIX A

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

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APPENDIX B

NCSU WASTE MANAGEMENT PLAN

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NC State University Design and Construction Guidelines

Division 02 Waste Materials Management – Reuse, Recycling, & Hazardous Waste

1.1 Purpose

- A. The following guidelines define waste management and disposal responsibilities for both hazardous and non-hazardous construction and demolition (C&D) wastes. The guidelines also address performance and reporting requirements.

2.0 General Requirements

A. Definitions

1. Construction & Demolition Waste: Building and site improvement materials, and other solid waste resulting from construction, demolition, renovation, or repair operations. Material stream also includes brick, concrete, asphalt, and aggregate.
2. Special Waste: Solid wastes that require special handling and management.
3. Hazardous Waste: Any solid waste that is ignitable, corrosive, reactive, or toxic; a listed hazardous material or containing a listed hazardous material per Title 40 Code of Federal Regulations Parts 260-270.
4. Universal Waste: Hazardous wastes that have been provided specific exemptions (40 CFR 273) to encourage recycling. Universal wastes are limited to recalled or cancelled pesticides and intact batteries, lamps, and mercury containing devices. State regulations prohibit the crushing of fluorescent lamps.
5. Salvage: Recovery of waste for reuse in the existing facility, a different facility, subsequent sale as State Surplus property, or other reuse efforts.
6. Recycle: Recovery of waste for processing and preparation into products or raw materials.
7. Yard waste: A solid waste consisting solely of vegetative matter resulting from landscaping maintenance.

B. Performance Goals and Requirements

1. All hazardous and non-hazardous generated waste shall be managed in accordance with local, state, and federal regulations.
2. Seventy-five percent (75%) of a project's non-hazardous waste must be diverted from landfill disposal through reuse and recycling.
3. One hundred percent (100%) of yard waste must be diverted from landfill disposal through reuse and recycling.
4. The Designer must complete the Designer Waste Information Form (<http://go.ncsu.edu/wasteinfoform>) and identify regulated wastes, as well as materials, fixtures, and equipment that are to be salvaged for reuse or recycled. The location of the staging area as well as the responsible party for removal, delivery, and/or pick up must also be included.
5. The completed **Designer Waste Information Form must be included in the Construction Documents** that go out for review and bid.
6. The Contractor must provide a Waste Management Plan (<http://go.ncsu.edu/wastemanagementplan>) to NC State for approval prior to implementing work. The plan shall include details on how the hazardous and non-hazardous generated waste will be managed in accordance with local, state, and federal regulations. Contractor must also provide all

NC State University Design and Construction Guidelines

Division 02 Waste Materials Management – Reuse, Recycling, & Hazardous Waste

materials, personnel, and protective equipment necessary to remove and store wastes in accordance with the plan. The Contractor must coordinate salvage or reuse efforts identified on the Designer Waste Information Form with NC State and/or the non-profit entity.

C. Reporting Requirements

1. Hazardous Waste

a) The Contractor must provide NC State with a copy of all hazardous, universal, and special waste disposal certifications and/or manifests for all waste shipped.

2. Non-Hazardous C&D Waste

a) All reuse, recycling, and landfilled materials are to be tracked and complied on NC State's tracking forms, which can be found at <https://recycling.ncsu.edu/wp-content/uploads/sites/3/2018/04/CD-Tracking-forms-for-upload.pdf>. The completed form, with weight tickets/invoices attached, is considered a required close-out document and must be submitted before final payment is issued.

3.0 Management of Hazardous, Universal, and Special Wastes

A. Hazardous, universal, and special wastes must be managed separately from other C&D wastes.

B. Disposal must be coordinated with NC State Environmental Health & Safety.

C. Special wastes include:

1. Paints, varnish, solvents, sealers, thinners, resins, roofing cement, adhesives, lubricants, and caulk, or drums and containers that once held these materials.
2. Treated wood including lumber, posts, ties, decks, and utility poles (creosote, arsenic, chromium, pentachlorophenol).
3. Asbestos, PCBs, mercury, or lead containing materials
4. Used oil
5. Lead acid batteries
6. Medical wastes

D. Waste disposal responsibility falls to one of two parties: the Contractor or NC State, as defined in the NC State Environmental Health and Safety's document:

Management of Building Demolition Debris available at: <http://go.ncsu.edu/demodebris>

1. Containers used for waste storage must be United States Department of Transportation approved. The Contractor must supply bins, tanks or tank trucks. Containers must remain closed at all times except when material is being added. NC State will provide containers for items collected by NC State.
2. Hazardous waste containers must have labels that clearly identify waste streams. Different waste streams cannot be combined in a shared container. The Contractor must identify the initial accumulation date on

NC State University Design and Construction Guidelines

Division 02 Waste Materials Management – Reuse, Recycling, & Hazardous Waste

- the hazardous waste label when waste is first placed in the container.
3. Waste containers must be stored in a secured, covered, and well identified area of the construction site. Hazardous waste cannot be stored for more than 90 days. Any waste stored for more than six days must be inspected, and the inspection documented, weekly.
 4. Spill response supplies must be on-site and adequate to contain 110% of any accumulated waste. Portable fire extinguishers must also be readily available. If a spill occurs, Contractor must contact NC State immediately and proceed with spill containment and clean up.
 5. The Contractor must provide NC State with a copy of all hazardous, universal, and special waste disposal certifications and/or manifests for all waste shipped.

4.0 Management of Non-Hazardous Waste

A. Priority 1 - Salvage of Construction and Demolition Waste for Reuse

1. Salvaged materials should first be evaluated for use in University construction projects. NC State Surplus Property Services should be considered if there are reusable materials that have resale value and are no longer needed by the University. Contact Waste Reduction and Recycling (ajbensle@ncsu.edu) for assistance with disposition.

Examples of Salvageable material include:

- a) Furniture and electronics
 - b) Cabinets and shelves that are not built-in
 - c) Sinks and water fountains
 - d) Paper towel dispensers
 - e) Newer light fixtures
 - f) Dry erase boards, chalkboards, and cork boards
 - g) Solid wood panel doors
 - h) Brick pavers
2. Contact vendors about take-back programs to recycle materials their company provides. These materials include, but are not limited to ceiling tiles, carpet tiles, and cubicle walls.
 3. Coordinate with the Project Manager to utilize the [NC State Construction Shop](#) for the careful removal of salvageable items prior to contractor demolition. An estimate for the Construction Shop's work must be received during design and must be initiated prior to the project going out to bid.

B. Priority 2 - Recycling of Construction and Demolition Waste

1. If materials are not a salvageable for reuse, they must be source separated to the greatest extent possible and recycled.
2. Common source separated materials for recycling include:
 - a) Cardboard
 - b) Bottles and cans
 - c) Scrap metal and wire

NC State University Design and Construction Guidelines

Division 02 Waste Materials Management – Reuse, Recycling, & Hazardous Waste

- d) Rigid plastics
 - e) Untreated/unpainted dimensional lumber
 - f) Gypsum board (unpainted)
 - g) Concrete
 - h) Asphalt (pavement and shingles)
 - i) Aggregate
 - j) Brick and CMU
3. 100% of the following materials must be recycled:
- a) Cardboard
 - b) Bottles and cans
 - c) Scrap metal and wire
 - d) Concrete
 - e) Asphalt (pavement and shingles)
 - f) Aggregate
 - g) Brick and CMU
 - h) Designer shall coordinate with Waste Reduction and Recycling office during design to properly coordinate selective demolition requirements and recycling goals.**
- C. Priority 3 - Disposal of Construction and Demolition Waste
- 1. If material/s cannot be salvaged for reuse or source separated and recycled, they must be sent to a C&D recycling and reclamation facility. Materials are not to be sent directly to a landfill or a facility that does not sort and recycle.
- D. All solid waste management facilities must be permitted to operate by NCDEQ in accordance with [15A NCAC 13B .0201](#).
- E. University Contract Pricing**
- 1. When available, the contractor may utilize University contract pricing for related facility tip costs or recycling rebates. In order to utilize contracts, contractor must coordinate with the University project manager and Waste Reduction and Recycling office.
- F. University Rolloff Services
- 1. Depending upon the scale of the work, dumpster services can be provided for Informal or Formal construction projects. Coordinate with NCSU Waste Reduction and Recycling to provide 17-20 cubic yard rolloffs. Rental and contact information; <https://recycling.ncsu.edu/rentals/>

WASTE MANAGEMENT PLAN

General

Wastes from construction, renovation, demolition, abatement, decommissioning, and other projects with environmental consequences warrant waste management plans to ensure proper waste management practices and recognition of responsibilities. Many of these types of projects involve contracted services, for which the University and its contractor(s) assume liabilities.

Waste management plans are intended to identify potential wastes to be managed, proper management practices, responsible parties, and needed services in simple and concise forms.

Site preparation may include land clearing, relocation of utilities, decontamination of existing structures, and demolition of existing structures. As the project progresses, some adjustments may be necessary for waste management activities, including relocation of waste areas and managing newly-discovered waste materials. The contractor's Waste Management Plan enables EH&S to efficiently plan regulated waste disposal and control costs.

Waste management plans will vary depending on the scale and scope of the project. In the most general terms, the plan should identify the general types of wastes that may be encountered for each phase of the project, the collection and accumulation strategy, marking and identification requirements, and procedures for appropriate removal of wastes from the site.

The contractor will submit a waste management plan to the University for approval prior to implementing any work. The approved plan will serve as the basis for project-specific plans. The Plan will specify procedures for all aspects of waste management.

Definitions and Abbreviations

Some key terms used in this document warranting explanation include:

- NCSU: North Carolina State University, designation may include project management or EH&S.
- NCSU EH&S: NCSU Environmental Health and Safety, primarily waste program personnel, but may include specialists for asbestos, lead paint, and other areas.
- Hazardous Waste: Wastes defined and regulated in Title 40 Code of Federal Regulations Parts 260-270.
- Universal Waste: Hazardous wastes designated by EPA that may be managed under less-restrictive regulations to encourage recycling.

Assignment of Waste Responsibilities

Waste generated by demolition, decontamination, decommissioning, abatement, maintenance of fixed facilities, and most site preparation wastes will be attributable to both the contractor and the

University as co-generated waste (University waste materials removed under contract, including lamp replacement and remediation). Accumulation and initial management of waste generated by project activities will be the responsibility of the contractor(s). The University may provide oversight to ensure protection of properties and liabilities. The contractor will prepare waste for collection by the University or shipment to facilities identified in the waste management plan. Hazardous or universal waste generated as a direct result of project activities (e.g., decontamination or demolition of structures, removal of batteries or mercury-containing articles) will leave the University under the University's signature.

NOTE: Wastes derived solely from materials that the contractor brought to the site, such as construction materials and cleaning of contractor equipment, will be the responsibility of the contractor, and may be included in the waste management plan.

The University project manager shall receive copies of disposal certifications and shipping papers for all wastes shipped. EH&S shall receive copies of disposal certifications and manifests for all shipping documents signed by EH&S, including all hazardous and universal wastes shipped.

Contractor Waste Management Form

The Contractor Waste Management Form contains updated and more detailed information for managing wastes of concern for NCSU EH&S. Once the contract has been awarded, the primary contractor completes the form which identifies the NCSU project manager, the principal contractor, and any responsible subcontractors. After completing the form, the contractor can submit the form using the "submit email" button or by emailing to env-health-haz-waste@ncsu.edu. The contractor is responsible for implementing the plans prepared by the project designer and managing site activities.

- Project Name:
- Contact Information:
 - NCSU Project Manager:
 - Contractor name, address, phone, and e-mail: Consider this to be the primary contractor.
 - Onsite contact and phone number:
 - Emergency contact and phone number: The contractor is generally held accountable for accidents that may occur on a project site. The role of EH&S in the event of an emergency is to protect University personnel and property beyond the project boundaries or scope.

- Subcontractor name, address, phone, and e-mail: Consider this to be the subcontractor(s) responsible for managing project “wastes of concern.”
 - Subcontractor’s emergency contact and phone number:
- EH&S requires information regarding facilities that may recycle, treat, or dispose of “wastes of concern” if disposed by the contractor.
- Wastes of Concern: Common wastes identified by EH&S as posing environmental or regulatory concerns have been listed, and additional wastes may be added by EH&S based on project design information. The contractor shall identify container types and specific storage locations for each type of waste listed.
- Areas where hazardous wastes are accumulated are required to be inspected at least weekly to ensure spills and other releases are minimized and controlled, and wastes are secured. The “wastes of concern” include materials that would be hazardous wastes if not managed properly. The contractor will comply with the EH&S requirement to document the inspection of waste areas on a weekly basis while “wastes of concern” are present. A weekly inspection log has been provided as a template for minimum inspection requirements.
 - Inspection criteria are presented with a simple description of concerns. The inspector’s legible signature, date, and time are required. The “Corrective Actions” should indicate the unacceptable condition, date corrected, and signature.
- Waste removal: The NCSU project manager shall contact EH&S for removal of wastes in accordance with the pre-determined disposal designations.
- Signature (primary contractor)

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Management of Regulated Demolition Debris

Contractor Waste Management Form

Contractor Waste Management Form			
Project Name:			
Contact Information			
NCSU Construction Manager:			
Contractor Name:		Subcontractor Name:	
Address:		Address:	
Phone Number:		Phone Number:	
Onsite Contact:		Emergency Contact:	
Phone Number:		Phone Number:	
Emergency Contact:			
Phone Number:			
Recycling/Reclamation Facility:		Phone Number:	
Treatment/Disposal Facility:		Phone Number:	
Wastes of Concern			
Type	Container Type*	Storage Location	Comments
Asbestos			
Decontamination/Cleaning Liquids			
Lead Paint			
Fluorescent Lamps			
Light Ballast			
Mercury Containing Equipment			
Batteries			
Sink Traps (labs only)			
Oil			
Scrap Tires			
White Goods			
Other:			
Other:			
Other:			
Other:			
Other:			
Other:			
*Container Type – Roll-off, Tank, Drum (specify size), Boxes, Other (specify)			
All Containers will be marked with the word “Waste” followed by a description of the contents and the date materials are first added. Waste storage areas shall be inspected at least weekly, with documentation of inspection available for the duration of the project. Check the appropriate waste management declaration below.			
“I have and will use the waste area inspection form or its equivalent.”			
“This project will not generate hazardous waste.”			
Signature		Date	
Please complete this form and e-mail to the Hazardous Waste Program Manager			

Contact EHS Hazardous Waste Program Manager with any questions at (919) 515-6863

NC STATE UNIVERSITY - REUSE OF CONSTRUCTION AND DEMOLITION MATERIALS

Date	
Location/Job Name	
Project Manager/Planner	
Released To	
Phone #	
Material Description	
Quantity Each Item	
Estimate Weight Each Item	
Estimate \$ Donation Value	
Released By (NCSU)	
Notes	

	<p>Description Of Program: The University has established a program to salvage building materials, parts and furnishings that would otherwise be considered construction and demolition waste. Prior to the beginning of construction and renovations projects on campus, Facilities Operations and other Donees will have an opportunity to reclaim C&D materials for reuse. Facilities Operations Trade shops will have first priority in the invitation to salvage materials from construction and renovation projects. Other donees, such as Habitat for Humanity may receive donation of reusable materials. The following conditions and procedure must be met in order to participate in the reuse program.</p>
<p>Criteria:</p>	
<p>Clear understanding of the purpose of the reuse program.</p>	
<p>Tracking the reuse materials is extremely important to protect all participants from possible liability claims or false acquisition of materials by shops or donees.</p>	
<p>Shop or donee is responsible for removal and transportation of materials.</p>	
<p>Shop or donee has adequate second use or storage for the materials.</p>	
<p>Shop or donee takes responsibility for the timely and lawful surplus or disposal of materials if an adequate reuse is not identified in an appropriate amount of time.</p>	
<p>Questions? Contact WRR at 919.515.9421 or recycling@ncsu.edu</p> <p>Return completed form to Waste Reduction and Recycling. Campus Box 7516 or recycling@ncsu.edu</p>	

APPENDIX C
NCSU GUIDELINES

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NC State University Design and Construction Guidelines

Division 01 NC State's Requirements

[Designer shall incorporate this document into the specification in its entirety.]

1.0 Purpose

- A. The following guidelines apply to North Carolina State University's ("NC State") requirements specific to the needs of NC State. It is the goal of NC State to identify specific needs relevant to working on a public university campus that will help the Contractor gain more knowledge and be fully aware of NC State's expectations while working on campus.
- B. References include the following:
 - 1. NC State Transportation's Contractor Parking Policies: <http://www2.acs.ncsu.edu/trans/parking/specialty.html>
 - 2. NC State University, Environmental Health and Public Safety, Fire Protection Department Hot Work Permit Procedures. Contractor shall access the following website to obtain hot work permits: http://www.ncsu.edu/ehs/fire/hot_work.htm

2.0 General Requirements

- A. The Owner's Representative - NC State will designate a Project Manager to act as the Owner's Representative in all matters pertaining to construction contracts. All official contacts, decisions, directions, problem resolution, coordination and other liaison activities required from NC State will be through the Project Manager. This requirement does not modify the responsibilities of the Designer as stated in the General Conditions of the Contract.
- B. Contractor, at its expense, shall conduct a background check for each of its employees, as well as for the employees of its subcontractors, who will perform any function or activity under this Agreement. NC State may withhold consent for any of Contractor's employees to be placed on a NC State assignment at its sole discretion.
- C. Behavior policy - All construction personnel shall be respectful of all members of the NC State community. Any incidents of disrespect, verbal abuse, threatening statements, unwelcome comments, unwelcome interaction or any form of harassment from any construction personnel toward any member of NC State community is strictly prohibited. Any such act shall constitute sufficient cause for NC State to remove any individual permanently from the project and all NC State property. In addition, any of the Contractor(s) project personnel who ignore or refuse to take action on any requirements of the contract documents or ignore or refuse to take immediate action to correct any endangerment to the health and safety of the public (as solely determined by NC State) shall be permanently removed from the project and NC State property. If in the sole determination of NC State it is in the best interest of the project and NC State to have any of the Contractor(s) personnel removed from the project, then the Contractor shall do so upon request by NC State. Such actions taken by NC State shall not constitute grounds for a delay claim. NC State will not be responsible for any delays caused to the project due to any individual being removed from the project by NC State.

NC State University Design and Construction Guidelines

Division 01 NC State's Requirements

D. Protection of Work, Property, and Public:

1. The single prime Contractor, Construction Manager at Risk or Project Expediter (on a multi prime project), henceforth referred to as "the Contractor," shall ensure that campus streets connecting to the project are protected from mud, sand, and stones/gravel. Streets and adjacent property sites shall be kept free from run-off, litter and/or debris in any form from the project site. Mud, litter and/or debris from the construction site that appears on adjacent property sites shall be removed immediately. All mud collected on vehicle tires shall be removed before leaving the construction area. Should any mud or debris from the project site collect on the streets, it shall be removed immediately to prevent any hazards to vehicular or pedestrian traffic as well as from entering the storm sewer system. In any event, all streets and property sites adjacent to the project site shall be cleaned of construction related debris, dust, litter and mud daily. The Contractor, in the preparation of bids, shall account for the daily cleaning of adjacent streets and property sites. The Contractor(s) is prohibited from discharging any waste products from concrete trucks or from concrete coring work, or any other unsuitable materials, fluids or other products on the site or into the storm sewer system. Should the Contractor fail to comply with these requirements, NC State reserves the right, with twenty-four (24) hours prior notice to the Contractor, to clean and or remove mud, trash, litter, debris or any unauthorized discharge from the project site and/or the adjacent streets or properties. In such case, the cost of the cleaning and/or removal or mobilization for cleaning and/or removal shall be deducted from the Contractor's contract.
2. The Contractor shall repair any damage (including but not limited to: scratches, cuts, dings, holes, track marks, etc.) of any kind made to existing hardscapes (asphalt/concrete roadway and drives, curb and gutter, brick sidewalks, etc.) by heavy equipment or other causes. Repairs shall consist of a complete, full depth removal and replacement of the affected asphalt, concrete or brick hardscapes at the Contractor's expense, or as otherwise determined by the Owner, to include the full width of the road, parking lot, walk or curb that is affected. The Contractor is strongly encouraged to be mindful of this while working around and off-loading equipment in areas of new construction adjacent to existing areas, which are not in the original scope of work to be renovated or repaved. In general, equipment shall be off-loaded inside of assigned staging areas, and the Contractor shall take protective measures as needed, including protective plywood or other means to prevent damage of the hardscape surface. The slightest damage will result in full hardscape replacement at the Contractor's expense.
3. Blasting on NC State property is prohibited.
4. Each Contractor doing excavation work is responsible for locating all existing underground utilities prior to commencing excavation. The Contractor shall be responsible for the associated cost of any utility interruption and repair due to his excavation if utility location was not requested, location procedures performed and followed prior to commencing excavation. The Contractor shall immediately notify NC State and restore the service of any utility disrupted due to excavation or any Contractor action whatever the circumstance. NC State reserves the right

NC State University Design and Construction Guidelines

Division 01 NC State's Requirements

to immediately restore the service of any utility disrupted due to actions of the Contractor and deduct the cost of such restoration from the Contractor's contract.

5. For emergency situations during construction, the Contractor shall furnish NC State with the names, pager numbers, and telephone numbers (day and night) of the Contractor's project manager and superintendent prior to beginning work. The numbers shall remain current or be updated as required for the duration of the project. The Contractor shall contact NC State via cell phone immediately in the event of an emergency. NC State will only provide security, as it deems prudent and necessary for its own protection. The Contractor shall be responsible for the security and safety of the project within the project limits. NC State must approve any "watchman" service instituted by the Contractor.
6. NC State will conduct normal operations during the duration of the project. The Contractor shall coordinate with NC State to minimize any disruptions to the functions of NC State.

E. Working Hours - The Contractor may establish a work schedule of his own choosing. The Contractor shall submit to NC State and to the Designer his regular daily work schedule and shall notify NC State in writing one week in advance of any deviations from the schedule. There are no restrictions regarding work hours. NC State reserves the right to limit the Contractor's activities when they conflict with NC State operations. These operations include but are not limited to the following: examination periods (typically for two weeks in December and two weeks in May), graduation (typically for one weekend in December and May), athletic events, and student move in/move out days. During these times, the Contractor may be required to cease all construction activities, limit activities to on-site only, modify working hours or restrict noise-making activities as determined by NC State.

- F. Contractor Daily Reports - The Contractor shall keep construction daily reports and provide, at NC State's request or on a minimum weekly basis, copies of these daily reports. The Contractor shall either use the company's standard daily report or use a template provided by NC State. The daily report shall at a minimum include the following information:
1. Project name, SCO Project ID#, NC State Project #
 2. Report #
 3. Date and time report was generated
 4. Weather data: overhead conditions, precipitation (if so, how much), temperature (high and low), impact on progress
 5. Sediment and erosion control
 6. Work performed (include all major trades)
 7. Number of workers on site
 8. Major equipment deliveries
 9. Major equipment working on site
 10. Difficulties encountered that may cause delay
 11. Days of no work and reason

NC State University Design and Construction Guidelines

Division 01 NC State's Requirements

- G. Meetings - The contractor shall at a minimum conduct weekly coordination meeting to review construction progress and any issues that need to be resolved. Contractor shall invite NC State and Designer as well as any required subcontractors.
- H. Inspection of the work - NC State will conduct the following inspections, as applicable, which shall be included in the construction schedule: in-wall inspections, above ceiling inspections, generator test, fire pump test, fire sprinkler main drain tests, pre-final inspections, 100% test of the fire detection and alarm system, third-party materials testing/special inspections/commissioning and a final inspection for project acceptance. Any inspections that are not satisfactory shall be repeated at no cost to NC State and shall not be cause for a time extension. All inspections will be conducted by NC State at the same time as the Designer's inspection and a punch list generated. The Contractor shall give the Designer and NC State a minimum of fourteen (14) calendar days prior notice that the systems have been verified by the Contractor to be complete, fully functional and ready for inspection. The following general guidelines apply to the above ceiling inspections:
1. The systems must be complete, including but not limited to controls, insulation, labeling, tagging, fireproofing, fire stopping, wiring, light fixtures installed, and all piping in place.
 2. Ceiling grid may be installed as required, framing for hard ceilings shall be in place, and access door locations shall be framed and noted.

Under no circumstance shall any ceiling or wall area be covered prior to the above ceiling inspection. All punch list items generated from the inspections shall be completed by the Contractor and verified by the Designer and NC State. Any re-inspection costs, including but not limited to Designer, NC State, State Construction Office (SCO) or third party personnel, that result from punch list items not being 100% complete shall be at the expense of the Contractor.
- I. Use of the Premises - Parking is extremely limited at NC State. Parking for personal vehicles on campus is not provided. Contractors must limit parking of company vehicles and storage of materials to within the limits of the construction site and staging area. The Contractor is required to follow NC State Transportation's Contractor Parking Policies (see web link on page one of this document).
- J. Utilities - It is imperative that all campus utilities and all other campus services are maintained at all times except for scheduled interruptions. Required utility interruptions shall be scheduled with and requested through NC State at least fourteen (14) days in advance for minor outages and thirty (30) days in advance for major outages. NC State is the sole determiner of the utility outage being major or minor. Major outages include but are not limited to those that affect an entire floor of a building, all of a building, all or parts of several buildings, all or parts of an area, and any high voltage outage. No utility interruption, regardless of the advance notice given, shall be undertaken without expressed, specific approval from NC State. If requested by NC State, utility outages shall be performed after hours and/or at night, or over the weekend, or during holidays. No extra payment will be made for such work. NC State personnel will perform certain activities in connection with utility outages such as operating existing electrical switches, turning existing water and steam valves, placing existing building systems back in

NC State University Design and Construction Guidelines

Division 01 NC State's Requirements

operation, operating existing fire alarm systems, etc. NC State will bear the expense of the work of their personnel. When the Contractor requires an additional or extra outage to complete their work because of a shortage of or improper materials, shortage of labor, poor coordination, failure to finish the work during the outage scheduled length of time, the Contractor will pay all expenses incurred for NC State's services for an additional outage(s). No service disruptions shall take place until barricades (if applicable) and signs are in place to notify and/or protect the public. Barricades must be maintained at all times and signs shall be neat and legible, hand-made signs are not acceptable. Signs for utility outage notice shall be written and placed as directed by NC State seven (7) workdays prior to the outage. NC State may determine the utility service cannot be interrupted for the length of time or frequency requested by the Contractor. In such case the Contractor shall include in his bid provisions for temporary utility services for the duration of the outage at no cost to NC State.

K. Survey of New and Existing Sub-surface Utilities - Perform field location surveys of new utilities installed as well as existing utilities uncovered during the construction phase. Conventional survey standards are to be utilized during the collection of field data. All work shall be performed by qualified personnel under the supervision of a Professional Land Surveyor. Accuracy Standards: horizontal and vertical location shall be $\pm 0.25'$. Survey (NAD83-North Carolina State Plane Coordinates) shall tie to NC State's horizontal & vertical control monuments.

1. Utility Drawing Set (Hard Copy)

- a) Cover Sheet - All projects require a cover sheet with the following information -
 - (1) NC State Project Name
 - (2) NC State Project Number
 - (3) NC State Building Name (s)
 - (4) NC State Building Number or Utility Zone Number (s)
 - (5) Project Phase (i.e. Schematic Design, Design Development, 100% Bid Documents, or Record Set)
 - (6) Sheet Name with discipline letter preceding sheet number (i.e. A100 for an Architectural Plan).
 - (7) Drawing Index
 - (8) Site Map
 - (9) For interior renovations, a hatched key plan indicating the extent of work
- b) Drawing Sizes – sheet sizes shall not exceed 36" x 48" and shall not be less than 24" x 36" in size.
- c) Include licensing seal and certification on 100% bid documents and record set documents.

2. Utility Drawing Set (Electronic Copy)

- a) Format shall be .pdf.
- b) Submission is required at each project phase.
- c) File naming shall be as follows:

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- (1) Typical file naming shall be as follows -
bldg #_ncsu project number_date_phase.pdf or
utility zone #_ncsu project number_date_phase.pdf
 - (2) Example: 799Z_201300001_10-31-12_sd.pdf
 - (3) For projects with multiple buildings or utility zones, the lowest number shall be used in file name.
3. Electronic Source CADD Files (Record Set and first Construction Document Submittal)
- a) Electronic files of all drawings shall include source drawings, font libraries, custom line styles/codes, plot style tables and other digital CADD related information.
 - b) The files shall be in AutoCAD .dwg format; the AutoCAD version shall be within the last 2 years of the current release.
 - c) Drawings shall be drawn at a scale of 1 to 1 in model space. Interior spaces shall be in Architectural inches. Exterior space shall be in US survey foot.
 - d) For exterior projects use NAD 83 North Carolina State plane coordinates.
 - e) All external references shall be bound as inserts or inserted directly as a block into the drawing. X-refs of any kind are not acceptable.
 - f) Remove licensing seals from drawing files.
 - g) Drawings shall be purged and audited.
 - h) Submission shall not include backup .bak files or .zip files.
 - i) Site, Civil, and Survey drawings shall use the NC State mapping drawing template, which includes NC State standard layers, linetypes and block symbols. The current version can be downloaded at www.ncsu.edu/facilities/con_guidelines/NCSU_CIV-SRV_TEMPLATE.dwg
4. Utility Submission
- a) Hard Copy - The Drawing Set shall be submitted on bond paper.
 - b) Electronic Files for the Record Drawing Set and Source CADD Files shall be accompanied by a transmittal with a listing of the included documents and the following information:
 - (1) NC State Project Number
 - (2) NC State Project Name
 - (3) NC State Building Number(s)
 - (4) NC State Building Name (s)
 - (5) NC State Project Manager's Name and Phone Number
 - (6) Submitting Professional's Name and Address
 - c) Electronic Files shall be submitted on a CD or DVD
 - (1) A .pdf file of the transmittal shall be included on each disk.

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- L. The following outline lists the utilities to be located and the data to be collected. Photographs shall be at a minimum resolution of 2200 x 1700. Digital photographs can be submitted in TIFF, JPG, or RAW file formats. File naming shall be all lower case text. File naming shall be as follows: bldg#_ncsu project number_util_photo#.file extension. For example: 135_201300001_util_1.jpg
1. Steam Tunnel and Lines
 - a) Location and elevations of the tunnel slab and top of tunnel centerlines.
 - b) Location and size of steam and condensation pipes in the tunnel, including changes in directions, expansion loops and anchors.
 - c) Top of pipe of any direct buried steam and condensation pipes, including changes in directions, expansion loops and anchors.
 - d) List the construction material for the tunnels.
 - e) Provide digital photographs of the tunnel, piping and expansions areas.
 2. Water Lines - (Domestic, Fire Main, Chilled, Hot Water, & Reuse Waterlines)
 - a) Locations, size and elevations at the top of installed water lines, including changes in direction.
 - b) Locations of valves and a valve type designation, meters, fire department connections, post indicator valves, hydrants, reducers, manholes, and backflow device.
 - c) Provide digital photographs of bends and valves.
 3. Electric and Communication Duct Banks and Direct Buried Conduit
 - a) Location and elevations of the duct bank top and bottom.
 - b) Location and elevations of conduit runs in the duct bank.
 - c) Location and elevations of any direct buried conduit or concrete duct bank.
 - d) Location and elevations of manhole rims, transformers, pedestals, switches, poles, overhead lines, junction boxes, panels, generators, and meter boxes.
 - e) Provide digital photographs of the tunnel and conduit configuration.
 4. Gas
 - a) Location and elevations of top of pipe and any change in direction.
 - b) Location and elevations of meters, pressure reducing stations, test stations, generators, and valves.
 5. Storm and Sanitary Sewer
 - a) Provide invert elevations for incoming and outgoing piping at manholes.
 - b) Provide top elevation of manhole cover.
 - c) Note if manhole rims are in the center of the structure or not. Measure the offset, pipe sizes, material types and the direction of the flow.
 - d) Provide digital photographs of structures.
 6. Existing Utilities

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- a) Locate and provide elevations consistent with new utility requirements of any existing utilities exposed during excavation of trenches for new utilities.
 - b) Provide digital photographs of the crossing or conflict.
7. Deliverables for Surveys
- a) The subsurface location data and platting shall be continuous throughout the project.
 - b) All data and plats are due to NC State within two-weeks of the backfilling of utilities or completion of the associated construction task.
- M. Traffic Movement and Interruptions - Road and sidewalk blockages shall be scheduled fourteen (14) days in advance and made only after NC State has approved them. Appropriate detours shall be planned, subject to approval by NC State, giving consideration to the handicapped access. No excavations shall take place prior to placing proper barricades, lighting, and other devices as shall be required. The Contractor shall install warning signs, barricades and detour information signs to maintain traffic flow as directed by NC State. If required, flagmen shall direct traffic around the construction area or detour area. Contractors are reminded of the presence on campus of handicapped students, staff and faculty. All barricades, temporary walkways, excavations, and stockpiled materials shall be placed and/or constructed in such a manner as to accommodate, adequately warn, and protect this segment of the campus population. The Contractor shall make requests for approval for any street, alley, driveway or any access way to be closed at least ten (10) work days prior to the date for the desired closing. The Contractor shall close no street, alley, driveway or access-way without prior approval by NC State. Pedestrian and vehicle traffic way-finding around the construction limits must be maintained in a clean and safe condition at all times.
- N. Fire Alarm Shutdowns - When requesting fire alarm shutdowns to support construction activities, the contractor shall provide advanced notice as determined by the NC State Project Manager. The contractor shall also be required to reimburse NC State for all costs associated with the fire alarm shutdown as follows:
1. During normal business hours (Monday – Friday, 7:00 AM – 5:00 PM): \$75.00 per disconnect and \$75.00 per reconnect for a total of \$150.00.
 2. After normal working hours (Monday – Friday, 5:01 PM – 6:59 AM; Saturday – Sunday): \$150.00 per disconnect and \$150.00 per reconnect for a total of \$300.00.
 3. If at any time the fire alarm system is not in operation after normal working hours then the contractor shall be required to employ a Fire Watch for the unprotected portion of the building, using NC State Fire Marshal's approved Fire Watch company (hourly rates vary but should not exceed \$35.00 per hour.)
- O. Hot Work Permits - When the Contractor is performing work that produces heat, flame, or sparks on or in an existing building or other structure the Contractor is required to obtain a "hot work" permit from NC State Environmental Health and Public Safety, Fire Protection Department. The department's requirements for the hot work program and permit can be found at the web link on the first page of this document.

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- P. Cleanliness and Site Maintenance - The Contractor(s) shall be responsible for keeping the project limits area, the project site, and the project itself clean and free of accumulated construction debris and trash. To that extent, the Contractor(s) shall be responsible for cleaning their work areas weekly at a minimum and the proper disposal of their construction debris and trash. The construction site and staging areas shall be cleaned as previously noted; however, should trash, litter or debris from the project site migrate to any adjacent campus areas it shall be removed immediately. Grass in the construction site shall be mowed as often as required to maintain a neat appearance or as requested by NC State but in no case less than once per month. Should the Contractor(s), in the sole judgment of NC State fail to comply with these requirements, then NC State reserves the right to proceed with cleaning within the project limits area, immediate project site, the interior of the project or, if applicable, the adjacent areas to the project as it deems necessary. The cost of the cleaning and/or the mobilization cost of cleaning will be deducted from the Contractor(s) contract.
- Q. Storage of construction materials and equipment - Storage of construction materials and equipment shall be limited to the staging area. Should the Contractor fail to remove any material stored or equipment outside the staging area within twenty-four (24) hours of notification received from NC State, NC State shall have the right to remove and dispose of such materials from the campus. NC State will deduct the cost of such removal and disposal from the Contractor(s) contract. The offending Contractor(s) shall be responsible for any delay to the project resulting from NC State having to remove and dispose of such materials or equipment.
- R. Construction site - A construction fence shall be installed around the perimeter of the project limits. The fence shall be constructed of heavy-duty chain link material, have a minimum height of six feet and shall have a continuous top tubular rail. Swing gates shall be included at every access to the enclosed area. The fence shall have an integral visual barrier or shall have shading type material applied and maintained for the duration of the project. Locks for the gates shall be interlocked with a padlock provided by NC State in order to allow access by NC State or other emergency personnel in case of an emergency.
- S. Inspection and Audit - Contractor's "records" shall upon reasonable notice be open to inspection and subject to audit and/or reproduction during normal business working hours. An NC State representative or an outside representative engaged by NC State may perform such audits. NC State or its designee may conduct such audits or inspections throughout the term of this contract and for a period of three years after final payment or longer if required by law.
1. Contractor's records as referred to in this contract shall include any and all information, materials and data of every kind and character, including without limitation, records, books, documents, subscriptions, recordings, agreements, purchase orders, leases, contracts, commitments, arrangements, notes, daily diaries, superintendent reports, drawings, receipts, vouchers and memoranda, and any and all other agreements, sources of information and matters that may in NC State's judgment have any bearing on or pertain to any matters, rights, duties or obligations under or covered by any Contract Document. Such records shall include (hard copy, as well as computer readable data if it can be made

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available): written policies and procedures; time sheets; payroll registers; payroll records; cancelled payroll checks; subcontract files (including proposals of successful and unsuccessful bidders, bid recaps, etc.); original estimates; estimating work sheets; correspondence; change order files (including documentation covering negotiated settlements); back charge logs and supporting documentation; invoices and related payment documentation; general ledger entries detailing cash and trade discounts earned; insurance rebates and dividends; and any other Contractor records which may have a bearing on matters of interest to NC State in connection with the Contractor's dealings with NC State (all foregoing hereinafter referred to as "records") to the extent necessary to adequately permit evaluation and verification of:

- a) Contractor compliance with contract requirements,
- b) Compliance with NC State's business ethics policies, and
- c) Compliance with provisions for pricing change orders, invoices or claims submitted by the Contractor or any of his payees.

T. Changes in the Work - Overhead shall also include all general conditions of the contract and all general requirements such as project management, scheduling, home office expense, engineering and layout, reproduction expenses, shop drawing processing and coordination, supervision, coordination, small tools, all vehicle expenses, temporary facilities, safety provisions, as built drawings, estimating, and general overhead.

1. The change order cost break down shall include: labor (number of hours and \$/hr) and material (quantity and \$/unit), including such breakdowns for work performed by the general contractor and all subcontractors. Unit prices shall only be allowed as stipulated in Article 19 of the contract General Conditions. Cost extensions shall be clearly shown for the labor and material prior to any mark-ups. The cost extensions shall be added into a labor and material subtotal. The labor shall then show a percentage for labor burden, while the materials shall show the applicable sales tax. These subtotals shall then be shown as a total for labor and material costs. The labor and material cost shall then show the allowed mark-up, and a final total. Subcontractor quotes shall be presented in the same format on the subcontractor's letterhead. Each item totaled on the Contractor's summary sheet shall be separated in the back up documentation by a colored sheet of paper. For change orders that delete any part of the work within the change order and/or contain deductive costs, the back up shall show the original material and labor for the deleted work or costs. If the change order contains both adds and deducts for the same type of work then the material unit and labor unit costs shown on the back up for the deleted work and the added work shall be the same and the net difference shown. Deductive change orders shall show the proper reduction in OH&P and the bond. The Contractor shall also provide HUB utilization information on NC State's Hub Utilization form. Failure by the Contractor to provide the information requested in this paragraph shall result in rejection of the change order by the designer and a request for re-submittal. Delay in the processing of the change order due to lack of proper submittal by the Contractor in accordance with this paragraph, or due to errors in the change order calculations shall not constitute grounds for a time extension or basis for a claim.

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2. For all proposed 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 and as required in General Condition Article 19 – Changes in the Work, paragraph “c”, “d”, and “e”. The designer shall verify correctness and determine that the Contractor’s proposed costs are equitable. After receipt of the Contractor’s proposal and if the proposal is correct and it is agreed to by the designer and NC State that the cost is equitable then NC State shall prepare a change order and forward it to the Contractor for his signature. If the change order proposal is incorrect, or the cost has not been agreed upon by the designer and NC State then the designer shall notify the Contractor that the proposal is rejected and the proposal shall be re-submitted. If the proposal is rejected because the cost are deemed not to be equitable then the contracting parties shall negotiate and agree upon the equitable value of the change and the proposal shall be resubmitted with costs determined under General Condition Article 19 – Changes in the Work Paragraph “e”.
3. Once proposed change orders have been reviewed and approved by the Contractor, Designer and NC State, the change order shall be processed for signatures electronically through the State Construction Office (SCO) web-based Interscope program. Directions for using Interscope shall be provided at the Pre-construction Conference.
4. If for whatever reason Interscope cannot be used for processing change orders, change orders shall be processed in hard copy format in accordance with General Condition Article 19 – Changes in the Work. The change order shall contain a brief description of the work on the 1st page of the SCO form and again on the second sheet of the form under “DESCRIPTION OF CHANGE”. On the second sheet there shall also be a brief description of the reason for the change along with a cause code listed. Each item totaled on the Contractor’s summary sheet shall be separated in the back up documentation by a colored sheet of paper. 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 NC State for signature. NC State shall execute the change order and forward to the State Construction Office for final approval. The State Construction Office shall review and upon approval execute the change order and keep one copy. The remaining copies are sent to the designer for distribution to NC State (two copies with original signatures) and to the Contractor (two copies). The Contractor shall forward a copy to his Surety. In the case of an emergency or extenuating circumstances, the approval of the changes may be obtained verbally by telephone or field order approved by all parties.
5. The Contractor shall also provide HUB utilization information on NC State’s Hub Utilization form.
6. Failure by the Contractor to provide the information requested in this paragraph shall result in rejection of the change order by the designer and a request for re-submittal. Delay in the processing of the change order due to lack of proper submittal by the Contractor in accordance with this paragraph or due to errors in the change order calculations shall not constitute grounds for a time extension or basis for a claim.

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- U. A time extension due to Weather - A rain day is defined as any day that rain exceeds one tenth of one inch (0.1"). The Contractor may only be entitled to extension of the contract period for the number of rain days that exceed the normal number of rain days for any given month. For the purpose of determining extent of delay attributable to unusual weather, a determination shall be made by comparing the weather for the contract period with the preceding five (5) year climatic range average during the same time interval based on statistics kept at NC State's Marine, Earth and Atmospheric Sciences department located on NC State's campus and on daily weather logs kept on the jobsite 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 and are in all other ways non-compensable.

Notwithstanding the immediately preceding paragraph, not all rain days above the normal number of rain days will warrant a contract time extension. Justification for the request for rain related contract time extensions must also be based on the effect of the rain on critical path work activity in progress during the period of the request and additionally be predicated on the Contractor's diligent prosecution of the work. No additional rain days shall be granted for building projects after the building has been "dried-in" as determined by the designer. The contract time extension request must incorporate work logs kept at the jobsite by the project superintendent showing the effect of the weather on the progress of the critical path work and the critical path schedule, both initialed by the designer's project representative.

Requests for contract time extensions based on rain days must be received by the designer on or before the 20th day of the month immediately following the month in which the rain occurred. The request must include all required documentation. All parties to this contract agree that the Contractor has no right to claim a contract time extension if the request is not received by the designer in strict accordance with the procedure set forth in this paragraph.

For other types of weather delays, the Contractor is granted one (1) day of contract extension for each day NC State is closed due to weather.

V. Final Inspection and Acceptance

1. In addition to all other contract inspection requirements, the following items shall be completed prior to scheduling a final inspection:
 - a) Training of NC State's Facilities Operations personnel shall be conducted with approved Operation and Maintenance Manuals (O&M's) provided at the training sessions.
 - b) Deliver to NC State one copy of all approved shop drawings (submittals) for the project.
 - c) Stairs: prior to final inspection, the Contractor shall submit to the Designer and NC State for review and approval as-built survey drawings of each set of stairs (exterior and interior) constructed as part of this contract. As-built survey drawings shall include dimensions of each riser and each tread and shall bear the seal of a licensed surveyor registered in the State of North Carolina. The Designer shall determine that the stairs

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are in full compliance with the current State of North Carolina Building Code, and if not in compliance, the Contractor, at his expense, shall make all required corrections, resurvey and resubmit as-builts for re-review and approval by the Designer and NC State.

2. The Contractor shall complete the following list, indicating the date of completion, prior to scheduling a final inspection and recommending acceptance of the project to NCSU. Items 1 and 2 must be completed prior to "substantial completion" as defined in Supplementary General Conditions 3.0 Article 23 "Time of completion - the Contractor shall coordinate with NC State the completion of some items on the list as required:

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Project Acceptance Checklist (also to be used for Beneficial Occupancy when applicable)

Project Name:

Code: Item:

Note: All items must be checked off with dates & initialed

accordingly

	Initial & Date
I. Pre-final Inspections	
A. Critical Items Check List:	
1. NCSU Environmental Health Safety Department certification of fume hoods	
2. NCSU Fire Marshall's inspection of life safety systems (FAS, Sprinkler System, Emergency Generator, Fire Pumps etc)	
3. Fire Extinguishers installed or delivered to NC State	
4. Roof & window water tests (when required)	
5. Date to coordinate NCSU Fac Ops Lock Shop to install locks and test in conjunction with Life Safety	
6. State Construction Office electrical inspection(s) complete	
7. Fire alarm inspection and certification by installer and design engineer complete	
8. Fire alarm inspected & approved by NCSU Electronics Shop & Fire Marshall	
9. Elevator inspection by Dept. of Labor, approval to operate the elevator obtained	
10. Demonstration of operation of fire pumps to NCSU Fire Marshall	
11. Operation of emergency and stand by power circuits verified	
12. Operation of emergency generator verified	
13. Dept. of Health water test results and approvals delivered to designer	
14. Dept. of Labor pressure vessel inspections and certificates issued and displayed.	
15. Endorsement of surety for beneficial occupancy (if applicable)	
16. Endorsement of Contractor's insurance company for beneficial occupancy (if applicable)	
17. Approval of SCO for beneficial occupancy (if applicable)	
18. Date for insurance transfers established	
II. Training and instruction of Facility Operations Personnel on Equipment	
A. Record of Instruction Sessions:	
Plumbing	
HVAC/ Controls	
Electrical	
Fire Alarm	
B. NC State O & M Manuals and pressure vessels info delivered to NC State	
III. Pre-Final Inspection	
A. Pre-final Punch list Certified as Complete by the Designer:	
General	
Mechanical	
Plumbing	
Electrical (including fire alarm system)	
IV. Final Inspections with SCO	
A. Date of Final Acceptance Inspection with SCO	
1. Date SCO punch list items complete	

All items complete and verified by the Designer

Signed _____ **Date:** _____

- W. Request for Payment – In addition to General Conditions Article 31 – Requests for Payments, Contractor payment applications shall have the following information clearly shown on the front page: NC State project number, Code & Item, State Construction Office Project Identification Number. No payment may be made for stored materials that are not stored within the project limits or on property owned by the State of North

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Carolina. Exception may be considered for material stored in a third-party, bonded warehouse with all appropriate documentation provided to NC State. Designer must verify that material is stored in a bonded warehouse and that the stored material is identified as NC State property. No payment shall be certified/approved by the Designer and forwarded to NC State for payment if not accompanied by the following:

1. A letter from the surety company consenting to the progress payment in the amount requested. The amount of the payment shall be shown on the letter.
2. A completed sales tax statement and form.
3. An updated CPM schedule.
4. MBE Appendix "E" Form with accurate subcontract amounts and amounts paid.
5. NC State project code, item number, project number and the State Construction Office ID number on the 1st sheet.
6. Pay applications without the information listed shown shall be considered incomplete and cannot be approved.
7. "Schedule of values" shall include payment line items for various commissioning activities.

No final payment shall be approved by the Designer and/or forwarded to NC State if not accompanied by the following:

8. Certificate of Compliance signed by the Designer of Record.
9. Certificate of Completion signed by the Designer of Record.
10. Completed Tax Statement and Form.
11. Consent of Surety for Final Payment.
12. Contractor's Affidavit of Payment of Debts and Claims.
13. Contractor's Affidavit for Release of Liens.
14. Contractor's General Guarantee.
15. Contractor's statement of any special or extended warranties.
16. MBE Appendix "E" Form with accurate subcontract amounts and amounts paid.

* NC State shall have 30 days from the time that correct and complete payment requests are received to pay the Contractor.

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NC State University Design and Construction Guidelines

Division 01 Contractor Safety Requirements

1.0 Purpose

- A. The purpose of this guideline is to define NC State contractor safety requirements. This guideline is intended to be a supplement to the General Conditions of the contract.
- B. The Designer shall incorporate this document into the specification in its entirety.

2.0 Reference Materials

- A. The following reference materials are required to be on every job site:
 - 1. NC State Environmental Health and Safety Manual
http://www.ncsu.edu/ehs/healthsafety_man.htm
 - 2. OSHA Regulations published by NC Department of Labor (DOL) (Available at: (800) NC-LABOR, <http://www.nclabor.com/pubs.htm>).
 - 3. Material Safety Data Sheets (MSDS) for all chemical products the contractor has brought to the worksite.
 - 4. The written safety plan of the Contractor or Subcontractor.

3.0 General Requirements

- A. Contractor Responsibilities. The contractor must notify NC State prior to:
 - 1. Performing blasting operations or use of powder-actuated tools
 - 2. Starting operations that will produce excessive odor, dust, noise affecting occupied building or work near air intakes
 - 3. Using a combustion engine indoors
 - 4. Air lifts with cranes, derricks, or hoists
 - 5. Breaking ground for an excavation or trench
 - 6. Using a laser
 - 7. Using any source of radioactive material
 - 8. Working with lead or asbestos containing materials

Violation of any safety, security, or environmental guidelines may result in the permanent removal of the contractor or their employees from the NC State premises.

- B. Hot Work Permits - A Hot Work Permit is required when any indoor or outdoor work will involve hot work, defined as use of flame, welding, soldering, cutting, brazing, grinding that causes sparks, use of asphalt or tar kettles, or other work that might create sufficient heat or spark to start a fire. Requirements for Contractors performing this work are contained in a 4-page document entitled “Hot Work Program” that is a part of

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the specifications package and can also be found at
http://www.ncsu.edu/ehs/fire/hot_work.htm.

- C. Contractor Safety Representative
 1. The Contractor shall perform daily job inspections and correct any unsafe conditions.
 2. Any accidents or near misses must be reported and investigated with the results given to NC State.
 3. The Contractor shall address safety at regularly scheduled meetings with subcontractors.

- D. Contractor Safety Plan - The Contractor must develop and implement a comprehensive safety plan for his or her employees, which covers all aspects of onsite construction operations and activities associated with the contract. This plan must comply with all applicable health and safety regulations and any project-specific requirements.

4.0 Contractor's Safety Reference Appendix

- A. All contractors and their employees must adhere to OSHA Regulations and the NC State Environmental Health and Safety Manual.

- B. Air Tools
 1. All hand and power tools and similar equipment, whether furnished by the employer or the employee, shall be maintained in a safe condition. Any tool found not in proper working order, or that develops a defect during use, shall be immediately removed from service and not used until properly repaired.
 2. All tools shall be used operated and maintained in accordance with OSHA and manufacturer requirements.

- C. Asbestos - If asbestos-containing materials are uncovered during construction, NC State must be notified *immediately*. Do *not* attempt to remove the material.

- D. Barricades and Guardrails
 1. Hazardous areas must be cordoned off with barricades or DANGER TAPE to warn workers and non-construction related traffic.
 2. When barricades, guardrails or opening covers must be removed for work to proceed, workers must be protected by a safety harness and lanyard tied off to a substantial structure member.
 3. Barricades, guardrails and covers must be replaced immediately at the end of the work shift.

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E. Compressed Gas Cylinders

1. Valve protection caps must be in place when compressed gas cylinders are transported, moved, or stored.
2. Cylinder valves must be closed when work is finished and when cylinders are empty or moved.
3. All compressed gas cylinders must be secured by chains, straps, or a rigid retaining bar or structure in an upright position at all times. Compressed gas cylinder shall be secured on an approved carrier while being transported.
4. Cylinders must be kept at a safe distance or shielded from welding or cutting operations.
5. Cylinders must not be placed where they can contact an electrical circuit.
6. The proper regulator is required to reduce compressed gases to a safe operating pressure.
7. Oxygen and fuel gas regulators must be in proper working order while in use. Back-flow check valves must be installed either at the regulator or the operation torch.
8. If a leak develops in a cylinder and it cannot be immediately corrected, the cylinder must be removed to a safe location outside of the building. If ignition source is flammable gas, call 911 and notify NC State.
9. Cylinders will be permanently marked, stenciled, or tagged to identify the “type of gas in the cylinder” per ANSI Standards. The name of the owner of the cylinder must be displayed.

F. Confined Space Entry

1. An OSHA *Permit-Required* Confined Space (PRCS) is a confined space that has one or more of the following characteristics:
 - a) Contains or has the potential to contain a hazardous atmosphere.
 - b) Contains a material that has the potential for engulfing an entrant.
 - c) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a small cross section.
 - d) Contains any other recognized serious safety or health hazard.
2. All contractors required to enter a NC State confined space must follow procedures found at <http://www.ncsu.edu/ehs/www99/right/handsMan/confined/confined1.htm>.

G. Contaminated Soil - If soil or any materials appear to be contaminated notify NC State.

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Division 01 Contractor Safety Requirements

- H. Cranes, Derricks and Hoists - Notify NC State ten (10) working days prior to the use of cranes.
- I. Electrical
 1. Any circuit to be worked on or connected to equipment to be worked on which is capable of being energized must be deenergized and Locked Out and Tagged prior to work. All electrical installations must comply with the requirements of the NEC.
 2. Contractor will follow all requirements as noted in NFPA 70E.
- J. Electrical Power Lines (Overhead) - The contractor shall have a trained and knowledgeable observer (flagmen) within sight of the operator and the overhead lines that will effectively provide guidance and clearance information to the operator as the equipment may approach the minimum approach distances. Advising the operator shall be the flagmen's one and only task. When conducting any work with a crane, derrick or hoist in the vicinity of any overhead electric power transmission or distribution line, the contractor shall observe all clearance requirements dictated by all applicable OSHA rules, as specifically contained within 29 CFR 1910 - Standards for General Industry, CFR 1926 - Standards for Construction, IEEE C2 - NEC, NFPA 70 - NEC, the NCSBC, ANSI standards and other applicable NC State safety guidelines and requirements. Further, no crane, derrick or hoist operator or contractor shall conduct any operation at any distance closer than 16 feet to any electric power transmission line lower than 200 kV or closer than 23 feet to any electric power transmission line at voltages higher than 200 kV and lower than 250 kV. Such distances shall be measured from the nearest boundary of the work zone to the nearest conductor, in a straight line.
- K. Elevators/Material Hoists
 1. Any persons operating elevators/hoists must be trained to do so. Documentation shall be kept onsite.
 2. No elevator/hoist with a defect shall be used.
 3. Elevator/hoist safety devices shall not be overridden or made inoperable.
- L. Emergency Equipment- The following shall not be moved, blocked, disabled or rendered inaccessible unless authorized by NC State:
 1. Fire equipment
 2. First aid equipment, fire blankets, stretchers, eyewash fountains and safety showers.
 3. Fire protection and detection systems.

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Division 01 Contractor Safety Requirements

- M. Emergency Medical Treatment - To receive the immediate assistance for emergency medical treatment call 911.

- N. Environmental and Chemical Requirements
 - 1. Contractors must provide NC State with a list of all chemicals to be used on NC State property and maintain a copy on site of the MSDS (OSHA Form 20 or equivalent) for each chemical prior to being brought on site. Each chemical container must be labeled *clearly* with the identity of the chemical and any associated hazards.
 - 2. Contractors must follow the safety procedures recommended by the manufacturer or seller of any chemicals, tools, equipment, or other materials. Contractors are to remove all empty containers, excess chemicals and chemical waste from NC State property.
 - 3. For all chemical incidents, contractor shall call 911 and notify NC State.

- O. Excavation and Trenches - Before doing any excavation work, the Contractor must locate all utilities by calling the local utility locator service and NC State.

- P. Excavating Equipment
 - 1. Seat belts shall be provided on all equipment covered by this section and shall meet the requirements of the Society of Automotive Engineers.
 - 2. Rollover protective structures (ROPS) and supporting attachment shall meet the minimum criteria detailed in OSHA.
 - 3. All earthmoving equipment shall have a service braking system capable of stopping and holding the equipment fully loaded, as specified by the Society of Automotive Engineers.
 - 4. All bidirectional machines, such as earthmoving or compacting equipment, and similar equipment, shall be equipped with a signal alarm at an audible level, distinguishable from the surrounding noise, which is operational when the machine is moving in either direction.
 - 5. Unauthorized personnel shall not be permitted to ride on powered industrial trucks.

- Q. Exit Routes
 - 1. Exit routes must be maintained at all times during construction.
 - 2. Lighting and marking must be adequate and appropriate.
 - 3. An employee alarm system must be operable.
 - 4. Exit routes must be kept free of explosive or highly flammable furnishings.

NC State University Design and Construction Guidelines

Division 01 Contractor Safety Requirements

5. Exit routes must be free and unobstructed. No materials or equipment may be placed, either permanently or temporarily, within the exit route. The exit access must not go through a room that can be locked, such as a bathroom, to reach an exit or exit discharge, nor may it lead into a dead-end corridor. Stairs or a ramp must be provided where the exit route is not substantially level. No materials shall be stored in a stairwell.

R. Explosives

1. Generally, the use of explosives is not allowed on NC State construction projects.
2. In the exceptional event that explosives are allowed, blasting must comply with the appropriate OSHA regulations.
3. A blasting plan must be provided to, reviewed by and approved in writing by NC State.

S. Fall Protection

1. Contractors shall provide and install all fall arrest protection systems as required by OSHA.
2. The contractor shall provide training requirements to each employee who might be exposed to fall hazards.

T. Fire Protection and Prevention

1. The contractor shall be responsible for the development and maintenance of an effective fire protection and prevention program at the job site throughout all phases of the construction. Contractors shall perform inspections on fire extinguishers monthly. Contractors shall immediately replace fire extinguishers that do not pass inspection.
2. Fire cutoffs shall be retained in buildings undergoing alterations or demolition until operations necessitate their removal.
3. If work requires the disabling of Fire Protection Devices, then the Contractor must request a Fire Alarm Disconnect from No alarm shall be disabled at anytime by the Contractor.

U. Floor Openings, Hatchways

1. Every hatchway and chute floor opening shall be protected in accordance with OSHA regulations.
2. Where operating conditions necessitate the feeding of material into any hatchway or chute opening, protection shall be provided to prevent a person from falling through the opening.

NC State University Design and Construction Guidelines

Division 01 Contractor Safety Requirements

V. Housekeeping

1. The Contractor must maintain a clean and orderly project job site. The Contractor shall maintain NC State's pathways free of rocks, mud, and other miscellaneous construction debris. The Contractor shall prevent the accumulation of dirt, dust, and / or other debris on NC State's roadways. The Contractor shall clean the travel ways on a daily basis. (Refer to project specifications for requirements.)
2. Waste material and debris must be removed from the work and access areas at least once a day. Waste material and debris should not be thrown from one level to another but should be carried down, lowered in containers or deposited in a disposal chute.
3. Materials must be neatly piled, stacked or otherwise stored to prevent tipping or collapsing. Materials must be carefully stacked and located so they do not block aisles, doors, fire extinguishers, safety showers and eye wash stations, fixed ladders or stairways.
4. Material to be lifted by crane or other hoisting devices must not be stored under overhead power lines.
5. No materials may be stored on penthouses, roofs, or other areas until a specific area is assigned by NC State for a specific project.

W. Illumination - Construction areas, ramps, runways, corridors, offices, shops, and storage areas shall be lit to not less than the minimum illumination intensities required by OSHA.

X. Ladders - All ladders must meet OSHA requirements.

Y. Lasers

1. Lasers must comply with the OSHA Construction Industry Standards.
2. Lasers must be low power (<5mw) devices with visible beams. Lasers to be used must bear a label indicating this maximum power output. Lasers that do not bear this label shall not be used.
3. "Laser in use" signs shall be posted according to OSHA requirements.
4. Lasers must be used in a manner that will not risk exposure to others.

Z. Lead

1. Lead may be found in certain painted surfaces. A check for lead presence should be conducted prior to certain activities such as grinding, sanding, or burning over painted surfaces. If lead containing paint is accidentally disturbed or a material is questionable NC State must be notified *immediately*. Do *not* attempt to remove the material.

NC State University Design and Construction Guidelines

Division 01 Contractor Safety Requirements

2. Hot Work over lead painted surfaces is generally not permitted.

AA. Lifting

1. Before lifting the load, think of alternate means of moving it (push, pull, roll, pour or pump).
2. Have firm footing and make sure the standing surface is not slippery.
3. Keep your back straight by tucking your chin in.
4. Tighten your stomach muscles and lift with your legs.
5. Lift the load slowly. DO NOT JERK!
6. Hold the load as close to the body as possible. Be sure you position the load close to the body before lifting.
7. Do not twist during your lift or when moving the load. Turn with your feet, not with your back.
8. Set the load down gently. Use your legs and keep your back as straight as possible.
9. Be sure your fingers are out of the way when putting the load down and when moving the load through tight spaces.
10. Ask for help if you need it and use mechanical means wherever it's available.

BB. Lock Out/Tag Out

1. All contractors that work on energized equipment with any hazardous energy source are required to deenergize and secure the source potential using a LOCKOUT / TAGOUT procedure as required by OSHA. Types of potential energy sources:
2. Electrical - This includes power supplies, batteries, capacitors and static electricity.
3. Hydraulic, air, gas pressure lines and vessels.
4. Thermal energy
5. Elevated materials, coiled springs

CC. Noise/Vibration

1. Noise producing equipment, such as power drills, jackhammers, welders, etc., can create sound levels of 80dB(A) or greater in and around a construction area. Notify NC State in advance to determine the appropriate times to operate high noise/vibration equipment for that project's location.
2. Appropriate personal protective equipment shall be used when working around high noise/vibration equipment.

NC State University Design and Construction Guidelines

Division 01 Contractor Safety Requirements

DD. Overhead Work

1. Work must not be performed above other personnel, including other contractor employees. Affected areas must be roped off or barricaded and marked to prohibit traffic.
2. Contractors must not climb on the heating and air-conditioning ductwork, plumbing steam piping, electrical cable trays, fixtures, or furniture or use as work platforms.
3. Contractors are expected to comply with OSHA fall protection requirements.

EE. Paints and Solvents - Contractors must provide the following safeguards:

1. Adequate ventilation must be maintained at all times when paints or solvents are being used.
2. Contractor personnel must use proper respiratory protection and protective clothing when toxicity of the material requires such protection.
3. Flammable solvents and materials must be used with extreme caution when possible sources of ignition exist.
4. Flammable paints and solvents must be stored in an approved flammable liquid storage cabinet when storage is required inside buildings. Acids and flammables must never be stored together. If an approved flammable liquid storage cabinet is not available, flammable paints and solvents must be removed from the building.
5. Flammable liquids must be dispensed in a safety can with a flash screen bearing a Factory Mutual or Underwriters Laboratory (UL) approval.

FF. Personal Protective Clothing and Equipment - Contractor shall determine this minimum level of protective equipment to be worn on the jobsite (example: hard hat, eye protection, safety vest, gloves and safety shoes). Any additional safety equipment required by a specific activity shall also be worn and shall meet or exceed OSHA standards.

GG. Powder-Actuated Tools

1. Powder-actuated tools are not to be used on NC State property unless specific approval is obtained from NC State prior to usage.
2. If approved, powder-actuated tools must be used in accordance with OSHA and manufacturer regulations.

HH. Power Vehicle Equipment

1. Only trained operators are allowed to use power vehicles on NC State property. Contractor management will be expected to provide proof of training if requested.

NC State University Design and Construction Guidelines

Division 01 Contractor Safety Requirements

2. Generally, LP gas powered trucks are not to be used inside NC State buildings. Prior approval from NC State is required.
3. The design of the LP gas fueled industrial truck for use within NC State buildings must comply with the following:
4. LP gas fueled industrial trucks must comply with NFPA 505-1982.
5. If trucks are continuous use in a populated area, they must be equipped with a catalytic converter.
6. LP gas containers must not exceed the nominal 45 pounds LP gas.
7. The following conditions and requirements will govern the use of LP gas fueled vehicles inside the confines of NC State buildings and structures:
8. LP gas fueled trucks must be removed from the building and parked at the end of each workday and not left unattended while in use. When the job requiring the truck is complete, the truck must be removed from the job site.
9. Trucks and tanks must not be refueled inside buildings.
10. All areas where LP gas fueled trucks are used must be well ventilated.
11. All LP cylinders must be stored outside and secured by a chain in an upright position.

II. Roof Safety

1. The contractor shall request authorization from NC State prior to accessing a roof.
2. During all rooftop operations, the contractor must provide fall protection measures in accordance with OSHA.
3. Two appropriate fire extinguishers of the correct ABC type are required when performing hot work on roofs. Other persons acting as a Fire Watch shall be in place on the roof and on the floor(s) directly below operation.

JJ. Sanitation

1. Drinking Water - An adequate supply of water, meeting the U.S. Public Health Service Drinking Water Standards, shall be provided.
2. Washing Facilities
 - a) The contractor shall provide adequate washing facilities for employees engaged in the application of paints, coating, herbicides, or insecticides, or in other operations where contaminants may be harmful to the employees. Such facilities shall be in near proximity to the worksite and shall be so equipped as to enable employees to remove such substances.
 - b) Hand soap or similar cleansing agents shall be provided.

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- c) Individual hand towels, cloth or paper, warm air blowers or clean individual sections of continuous cloth toweling, shall be provided.
 - 3. Toilet facilities shall be provided for employees according to the OSHA requirements.
- KK. Scaffoldings - Contractor shall erect, use and dismantle scaffolding in accordance with OSHA and manufacturer regulations.
- LL. Signs and Barriers
 - 1. Adequate signs and barriers shall be used where hazards exist.
 - 2. All holes shall be covered, secured, and properly marked.
- MM. Smoking and Open Flames
 - 1. Smoking is not allowed in any NC State buildings, including roofs, penthouses, electrical / mechanical rooms and basements.
 - 2. The use of open flames is strictly prohibited in areas where flammable liquids, gases, or highly combustible materials are stored, handled or processed.
 - 3. The use of open flames, where allowed, requires a Hot Work Permit.
- NN. Tarpaulins - When tarpaulins are required for the deflection of hot slag, dust, paint drippings, etc., or as a security barrier, they must be flame resistant and in good condition, free of holes and worn edges.
- OO. Tar Pots (tar kettles) - Tar Pots are not allowed on roofs. The contractor must notify NC State prior to using tar pots and obtain a Hot Work permit.
- PP. Temporary Heating - When heaters are used in confined spaces, special care shall be taken to provide sufficient ventilation in order to ensure proper combustion, maintain the health and safety of workmen, and limit temperature rise in the area.
- QQ. Temporary Lighting - Contractor shall submit a lighting plan for night work, underground work, and any other worksites without adequate lighting.
- RR. Vehicle Operation
 - 1. All equipment shall have operational backup alarms. Equipment shall not be utilized until such device is functioning properly.
 - 2. All vehicles shall be operated in accordance with OSHA and manufacturer regulations.

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Division 01 Contractor Safety Requirements

- SS. Vertical Lifts - All contractors' platforms or vertical lifts must meet OSHA and manufacturer requirements.
- TT. Warning Signs
1. All traffic control shall be approved by NC State and meet the Institute for Transportation Research and Education (ITRE) Work Zone Safety Guidelines for Construction, Maintenance and Utility Operations.
 2. The contractor shall provide warning signs, barriers, barricades, etc., in accordance with the construction plans and specifications or whenever such protection is needed.
 3. Where signs and barricades do not provide adequate protection, particularly along a road, walkway, or main aisle, flagmen shall be used.
 4. Review with the crew, each person's responsibility regarding the traffic control set-up (e.g. sign installation, lane closure setup, etc.).
 5. Review traffic control devices to be used at the site. Assure that traffic control set-up is properly installed. Installer shall document what traffic control set-up was used (including the sign types and sign locations) and how it was installed.
- UU. Work Zone Tail Gate Safety Meetings - "Tailgate" or "toolbox" safety meetings shall be held at the beginning of each work period (normally in the morning before leaving the yard or work staging area) and led by a competent safety professional.

NC State University Design and Construction Guidelines

Division 01 Temporary Facilities

1.0 Purpose

- A. The following guidelines for the use of temporary facilities during construction shall be incorporated into the Construction Documents.

2.0 General Requirements

- A. Project Signs – Project signs are not allowed. Directional signs for material deliveries are allowed within the construction area, if required, and shall be 4' wide x 2' high maximum, black and white only. The NCSU Project Manager shall approve the design of the sign and the sign text. **[Designer shall coordinate with NCSU PM for a sample layout of temporary construction sign.]**
- B. **[Designer shall provide detailed pedestrian detour plans as part of the contract documents** and show quantity, location, and layout of pedestrian detour signs on the detour plan.] Sidewalks shall remain open and accessible during construction. Should sidewalks require closure, an accessible and safe temporary (concrete, asphalt or plywood) pedestrian path around construction shall be required if an alternative accessible route is not close by. Temporary paths shall be shown on the contract documents clearly showing path and type of construction.
- C. The construction site shall be secured. Contract documents shall clearly indicate limits of construction and location of the construction fence. The fence shall be constructed of heavy-duty chain link material, have a minimum height of six feet and shall have a continuous top tubular rail. Swing gates shall be included at every access to the enclosed area and shall be lockable. The fence shall have an integral visual barrier or shall have shading type material applied and maintained for the duration of the project. Locks for the gates shall be interlocked with a padlock provided by NCSU in order to allow access by NCSU or other emergency personnel in case of emergency.
- D. Walks, Root Zones, and Lawn Protection - A permit, issued by NC State Grounds Management, is required for vehicular access to brick and landscape areas. For single loads up to 9000 lbs., a ¾" minimum plywood base shall be placed over brick paving, root zones of trees, and lawn areas to be protected from vehicular work traffic at a construction site. For single loads over 9000 lbs., two layers of ¾" plywood is required. Root zones and lawn areas shall not be covered with plywood for more than 3 consecutive days.
- E. For projects of duration longer than 3 days or requiring multiple heavy loads into a construction landscape protection zone, a construction entry road shall be included in the contract documents **[Designer must show on the contract drawings, including a detailed cross section]** to indicate access route for heavy loads into the site. This construction entry shall consist of 10' x 16' oak logging mats on 6" coarse, chipped, hardwood placed on a permeable structural, filter fabric, top-dressed with an additional 10" of hardwood mulch. Mulch and logging mats shall be supplemented throughout the project to keep the access area structurally functional. At the end of the project the

NC State University Design and Construction Guidelines

Division 01 Temporary Facilities

logging mats shall be offered to Facilities Operations for salvage or disposed of off site at the discretion of the Owner.

- F. All pruning of existing plant materials, including roots and limbs, for construction clearances shall be done by a trained, licensed, insured arborist and according to standards set forth in the National Arborist Association publication "Standards for the Pruning for Shade Trees". All pruning shall be coordinated with and inspected by NC State Grounds Management. **[The Designer and University Landscape Architect shall assess the necessity for this work during the design phase and determine whether work will be performed by contractor or NC State Grounds Management. Designer shall identify on contract drawings who will perform pruning.]**

- G. Transportation/Parking. **[Designer shall incorporate latest NC State Transportation Guidelines for Parking, Traffic Control and Road Closures.]**

Transportation Policy Summary

Purpose:

This policy is to ensure construction projects on campus have minimal impact on parking resources while attempting to meet the needs of the project. All projects, formal and informal, will be reviewed by Transportation who will collaborate with the University's Project Manager to make the determination of parking impact, mitigation and provision of parking resources to the project and associated contractors. Any exception to this policy will be at the discretion of Transportation on a case-by-case basis and shall not be considered precedent or binding. Transportation reserves the right to modify or change project parking arrangements to ensure the effective use of parking resources commensurate with any project legal obligations.

Contractor Vehicle Parking

- On Campus
 - Permits are required for every vehicle to park on campus and must be displayed properly.
 - "CON" parking permits are issued to/for a company vehicle, and may be limited to the primary contractor of record.
 - "CON" permits will not be approved for personal vehicles and vehicles of employees hired by subcontractors.
- Off Campus
 - Employees not eligible for "CON" permits must park off campus.
 - Free parking is available off-campus at our Park & Ride lot located at Carter-Finley Stadium, and is served by our free Wolfline bus into campus. No limitations to daytime parking in these lots.
 - It is the responsibility of the contractors to provide shuttles to and from the work site if employees do not use Wolfline.

Staging Areas

- The purpose of staging areas is to provide adequate area for material lay down, waste containers and construction equipment access to perform required work.
- Staging areas are to be determined during the project design cycles to allow Transportation adequate time to address parking impacts.

- Staging areas must be approved by Transportation. Requests must be submitted in writing and approved by NCSU Transportation prior to the completion of initial planning and design.
- Staging areas outside of parking areas must be approved by Landscape Services. Brick permit information may be found at: <http://policies.ncsu.edu/regulation/reg-07-25-09>
- Any changes to the initial staging configuration must be approved in advance by Transportation.
- Staging areas designated for materials must be fenced off. Transportation is not liable for stolen materials.
- Unless otherwise approved by Transportation, staging areas are not intended for private vehicle parking.
- It is the responsibility of the contractor to maintain and restore any damage to parking areas to include cleaning, removing debris and restriping parking stalls deteriorated by the project. Waste containers must have plywood beneath to protect the asphalt.

Parking Citations

- Tickets may be issued for parking in non-valid areas such as sidewalks, brick, landscape, or any other area that is not an official space in the correct permitted area.
- Unpaid parking citations will be forwarded to the Attorney General's Office for collection from the registered owner of the vehicle.
- Any contractor/individual who has unpaid parking fines will not be allowed to purchase parking permits until fines are paid.

Summer Break Waiver

- Waiver of staging area fees may be considered if the following conditions are satisfied:
 - Projects must begin after graduation in May and be completed prior to August 10.
 - Parking conditions are restored to original condition prior to staging area being reserved. Application can be found on Page 5 and 6 of this document.
- Summer waivers are not guaranteed and must be approved by Transportation.
- Parking fees will not be waived.
- If projects do not meet the appropriate requirements above, or the duration extends beyond what was originally predicted, fees will be charged for the total duration of the project.
- NCSU Project managers do not have the authority to approve a summer break waiver.
- Project managers must ensure permit fees/staging areas are included in all bids.

Construction Parking and Staging Area Application

Please fill out information completely & fax to NCSU Transportation
at 919-515-7650 or email to cddobek@ncsu.edu
Allow 5 business days for reply

Company Name:

Contact Person:

Billing Address:

Email Address:

Phone

Fax

Mobile

Location of Project on Campus (building/street)

Date of Project: Start

End

Project #

NCSU Project Manager

Please indicate on work sheet the number and type of permit/spaces requested. NCSU Transportation will assist with development of a parking/staging plan during the design process.

Reserved/Staging Area Spaces: x\$75.00x month(s) = \$

Contractor (CON) x\$75.00x month(s) = \$

Non-Company Vehicle Permit: x\$75.00x month(s) = \$

Service Provider (SP) Permit*: x \$750 for 2019-2020 year = \$

Total Estimated Cost: \$

Daily parking permissions are \$15 a day and can be purchased in-house or online.

Would you like more information? Yes No

I have read and understand the attached policies, and agree to abide by the policies of NCSU Transportation.

Authorized Agent of General Contractor/NCSU PM Date

Approved by NCSU Transportation Construction Liaison Date

*Must submit Application for Service Provider (SP) Parking permit for approval.
Application can be found at ncsu.edu/transportation

Additional Policies

Road Closures

If partial or full road closures are required, it is the responsibility of the contractor to inform NCSU Transportation a minimum of three (3) business days prior to the closure for the purpose of public notification. The contractor will be responsible for posting flagmen and appropriate signage in these situations. Please refer to the MUTCD (Manual on Uniform Traffic Control Devices) - http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/pdf_index.htm - Part 6, Temporary Traffic Control for specifications. If the contractor fails to comply and NCSU Transportation has to send enforcement to direct or redirect traffic, the contractor will be billed **\$50.00** per staff member, per hour, with a two-hour minimum. NCSU Transportation strongly suggests that any road closures be scheduled on weekends or during class breaks.

Site

General site safety and cleanliness is the responsibility of the contractor. A poorly maintained site is a negative reflection on both the contractor and North Carolina State University. Projects must maintain a safe, clean area in and around the designated staging area. Fencing, barriers, equipment, or vehicles should be placed so as not to be a hazard for pedestrian or vehicular traffic. The contractor is responsible for returning parking spaces used for staging, lay down and reserved parking to their original condition, unless specified otherwise in the construction contract documents.

Billing

The billing process for a project's staging area or reserved spaces will be handled according to project duration. Projects lasting more than three (3) months are billed quarterly over the duration of the project. Projects lasting less than three (3) months are billed at the beginning of the project. Contractors must contact NCSU Transportation and schedule a walk-through inspection upon completion to relinquish parking rights and responsibilities. Billings will continue until written or electronic notification is provided to Transportation that the spaces are no longer need and/or being utilized.

Compliance

At all times, communicating this policy to all subcontractors is the responsibility of the general contractor. Failure by the general contractor to communicate these requirements may result in the denial of general contractor parking for remainder of project. Final payment for the construction contract will not be released until all outstanding violations have been resolved.

SP Permits

The Service Provider (SP) parking permit does not designate a specific parking space. The SP permit validates parking in the following permit areas: B, C, CB, CC, CD, DD, F, RE, RW, RC, RCS, SV and W. The SP permit may not park in the following permit area/spaces: A, AS, RD and accessible spaces. The SP parking permit will only be issued on a yearly basis.

All parking permits must be paid for in full at the time of purchase.

Failure to communicate these policies does not relieve a contractor or a subcontractor from responsibility for parking citation received on campus. Any citations received for failure to follow parking regulations must be paid.

SUMMER WAIVER APPLICATION

To: NCSU Transportation Construction Liaison

From: Contractor/NCSU Project Manager

Date:

Subj: Summer Waiver Request for

I request to have associated staging-related costs waived for a specific project that is scheduled to begin after the spring term ends and be completed prior to the beginning of the fall term. Request criteria:

- 1) The request must be submitted at least 2 weeks days prior to the start date of the project;
- 2) The project start date is after May graduation (typically the 2nd week in May);
- 3) The project has a completion date on or prior to August 1st;
- 4) At project end date, there is no remaining equipment, construction debris, or parking space(s)/lot(s) requiring repairs.

If request is approved, a application signed by the primary contractor, the respective NCSU Project Manager and a representative from NCSU Transportation will be completed and kept on file.

Granting of a summer waiver is of the discretion of NCSU Transportation. Waivers may not be given for all parking areas. If project is completed in time frame that meets criteria listed above, costs will be waived. If project fails to meet all criteria listed above, NCSU Transportation will charge the responsible paying party for any associated fees accumulated beyond August 1st. The contractor or NCSU PM must make arrangements for payment with the NCSU Transportation Construction Representative if the project exceeds this time limit.

Please fill out completely (Use N/A if not applicable):

Project Name:

Project Location(s):

Project Start Date:

Project Finish Date:

NCSU Project Manager:

Phone Number:

Primary Contractor Name:

Primary Contractor Phone Number:

Primary Contractor Email:

Staging Area Required Yes No

Number of spaces needed in Staging Area:

Lot/Street Location:

Lot Closure Yes No

If a fenced staging area is not required, how many, if any, parking spaces are requested for material lay down, etc.:

Signature (Contractor)

Signature (NCSU Project Manager/Rep)

Signature (NCSU Transportation Rep)

NC State University Design and Construction Guidelines

Division 26 Fire Alarm Systems

1.0 Purpose

A. The following guideline provides the minimum standards and requirements for fire alarm systems.

2.0 Procedural:

A. The NC State design project manager shall schedule a meeting with the NC State Facilities Operations Electronic Systems team prior to initiating design.

B. The Engineer of Record shall insure continuous alarm protection when designing fire alarm systems where upgrading, modifying or phasing of work is required. Fire alarm protection shall be maintained in occupied areas at all times. The Engineer of Record shall prepare a construction phasing plan to be included in the bid documents.

3.0 General Requirements

A. The Fire Alarm System design and installation shall comply with requirements of the latest edition of NC State Construction Office (SCO) design and testing guidelines titled Fire Detection and Alarm Systems
<http://www.ncsco.com/documents/guidelines/2011FireAlarmGuidelines.pdf> and NC SCO Electrical Guidelines and Policies
http://www.ncsco.com/documents/guidelines/2011_Electrical_Guidelines.pdf

B. Fire Alarm Systems shall be installed by an approved manufacturer certified by the manufacturer.
http://www.ncsu.edu/ncsu/facilities/con_guidelines/pdfs/Division00_PREFERRED_Manufacturers_List.pdf

C. Engineer of Record shall design a complete fire detection system with total smoke detector coverage.

D. The Designer shall witness 100% test and provide a copy of the verified NFPA 72 Record of Completion Form 1-6.2.1 to NC State.

E. The installation shall meet NFPA 72, chapter 6 Requirements for Notification Appliances for Fire Alarm Systems. A performance specification may be used to ensure compliance with all applicable codes, however the minimum quantity of notification appliances shall be as shown on plans and risers. A performance specification may be used to ensure the required audible signal levels are achieved.

F. The Fire Alarm Control Panel (FACP) or annunciator, shall be mounted at the building's designated emergency entrance. Annunciation of all building alarms shall occur in one central location. This includes fire, ventilation failure, and gas monitor alarms.

NC State University Design and Construction Guidelines

Division 26 Fire Alarm Systems

G. Prior to accepting the fire alarm shop drawing package, the Designer shall conduct a mandatory fire alarm review meeting to review the fire alarm shop drawing package with NC State.

H. The Contractor shall conduct a mandatory pre-construction meeting with the electrical contractor, the fire alarm contractor and NC State.

I. The contractor shall submit shop drawings of the fire alarm system to NC State for review. The plan drawing showing devices, system riser, system interconnection drawings, and manufacturer's specification sheets shall be included. Drawings shall include design ambient sound level, audible alarm device sound power and alarm sound level for each space. Additional devices required while verifying the system shall be at contractor's expense.

J. Prior to final inspection:

- a) the Fire Alarm Contractor shall demonstrate 100% compliance with plans, submittals, specifications and NFPA 72 to NC State.
- b) Designer shall provide fully completed ***NC State Fire Alarm System Checklist for Addressable Systems*** to NC State. Form is available as attachment to this guideline.

4.0 Materials and Standards

A. The fire alarm system design shall include at a minimum:

1. A dual contact time-delay relay (minimum 60 seconds capability) installed at the main FACP to delay system trouble signals to the Emergency Communications Center.
2. Compression type fittings for all conduit with insulated throats.
3. If duct smoke detectors and/or linear beam smoke detectors are installed, a Remote Alarm Indicating Light (RAIL) that includes a test switch mounted at 8'-0" AFF shall be provided.
4. Magnet test capability for all smoke detectors.
5. Pull stations with keyed locks for resetting purposes. Allen key type locks are unacceptable. Two (2) keys for each pull station shall be supplied to NC State.
6. Three (3) isolation modules for each addressable loop; two (2) at the FACP and one (1) midway through the loop address scheme.

NC State University Design and Construction Guidelines

Division 26 Fire Alarm Systems

7. Devices for addressable systems to match the brand of FACP installed. These devices shall be addressable analog devices.
 8. The following bypass switches must be programmed into the system:
 - c) Audio/visual bypass
 - d) Tamper switch bypass (programmed as non-latching)
 - e) Waterflow bypass (silenceable only)
 9. Wiring color codes shall be white/red, 14 gauge stranded, THHN for conventional initiating circuit. The color code for door holders shall be orange+/grey-, 14 gauge stranded, THHN.
 10. CO/Freon gas alarms that require monitoring shall tie directly to the DAC.
 11. Air Handling Units 15,000 cfm or larger require duct detectors on the supply and return sides of the unit.
 12. Duct detectors in laboratory buildings shall shut down air handlers only when smoke is detected at the duct detector. General alarm shall not shut down these units.
 13. A minimum of one addressable loop shall be provided per building floor.
 14. All fire alarm system devices located on any exterior building surface shall be weatherproof as defined by the National Electric Code.
 15. Systems installed in building additions or renovations shall be U.L. listed, matching existing devices or approved compatible devices for use with the existing fire alarm control panel (FACP)
- B. All devices for fire alarm systems shall be U.L. listed, matching existing devices or approved compatible devices for use with the existing FACP.
- C. The Contractor shall provide any special equipment, tools, and programming devices required for the operation, maintenance or repair of the installed fire alarm system.
- D. Costs for modifying the existing FACP shall be included in the contract.
- E. Approved Contractor and Vendors
1. Fire alarm systems shall be fully serviceable and programmable by NC State and shall be U.L. certified as installed.
 2. Fire Alarm Contractor shall specialize in fire alarm system installation, be factory trained and certified, with a minimum of five (5) years documented experience installing and maintaining fire alarm system for similar installations.

NC State University Design and Construction Guidelines

Division 26 Fire Alarm Systems

F. One annual preventive maintenance (PM) test shall be performed on the entire fire alarm system between six (6) and twelve (12) months after NC State's acceptance. All system deficiencies found shall be documented and corrected. This PM shall include all items to be annually tested as defined by the edition of NFPA 72 enforced at the time of system acceptance, in addition to the following:

1. A complete software backup.
2. A fifteen work-day notice of testing scheduled by the Contractor through NC State. Testing shall be witnessed by a representative designated by NC State.
3. A report consisting of the NFPA Inspection and Testing Form furnished by the contractor, to the Engineer of Record and NC State within two (2) days after completion of this test.

G. Training Requirements

1. On-site training shall include:
 - a) variable changes
 - b) programming changes
 - c) report creations and changes
 - d) system functional changes
2. Contractor shall provide 16 hours of on-site owner training to NC State personnel. Training to include hardware repair and maintenance of all building panels and devices, including but not limited to, diagnostic procedures, system expansion, and maintenance techniques.
3. Contractor shall provide a factory sponsored certified technical training for system installed. This training shall certify two (2) technicians to maintain, service, and program installed system and receive direct manufacturer's technical support for these systems, to include software updates if applicable. All expenses to include tuition, transportation, and lodging for this training, shall be the responsibility of the contractor.

H. Labeling Requirements

2. Junction box covers shall be labeled as to their contents using an electronic labeling system with black letters on white background.
3. Contractor shall label all wires terminating in junction boxes and riser boxes. These labels shall be self-sticking wire numbers.
4. All device labels shall be made using an electronic labeling system with black letters on white background. Write-on labels are prohibited. Contractor shall provide a typed legend for all junction boxes and riser boxes corresponding to these labels. Legend shall be mounted in riser boxes. If system does not have riser boxes, contractor shall provide legend to NC State at time of NC State acceptance.

NC State University Design and Construction Guidelines

Division 26 Fire Alarm Systems

5. All initiating devices for conventional systems (not addressable) shall be labeled with their zone and sequence number.
 6. All initiating devices and modules for Intelligent Point Identification Device (P.I.D) systems shall be labeled with their addresses, including loop and point number.
- I. Programming and Software Requirements
1. Contractor shall provide all software, hardware, interfaces, adapters, and cables required for all programming and maintenance functions.
 2. If the contractor would normally use a laptop to program the system, a similar computer shall be supplied even if programming from the FACP keypad is available.
 3. Contractor shall provide all software required for full system maintenance and upgrades to fire alarm system including any device changes, additions, or deletions.
 4. Contractor shall provide all software updates during the warranty period and upgrades to software following the warranty period that address system operating failures or defects during the life of the system.
 5. Contractor shall provide all levels of password access with documentation.
- J. Digital Alarm Communicator/Transmitter (DACT) Communication
1. The fire alarm system DACT shall communicate separate signals for Fire Alarm (zone 3), Fire Alarm Trouble (zone 4), Sprinkler Alarm and Sprinkler Waterflow Alarm (zone 5), and Sprinkler Supervisory Trouble (zone 6). All other zones/signals required for specific installations shall be coordinated and approved by NC State before installation and programming. Digital communications shall be via 10 channel dialer complete with battery back-up.
http://www.ncsu.edu/ncsu/facilities/con_guidelines/pdfs/Division00_PREFERRED_Manufacturers_List.pdf
 2. The DACT shall be mounted in an adjacent or nearest mechanical or electrical room to the FACP. Installation in a telecommunications equipment room or a housekeeping closet is prohibited.
 3. The Contractor shall install conduit from a location next to the DACT for connection of the dialer to the main telecommunications room. A minimum 4x4x2.5 inch deep hinged enclosure shall be installed within one (1) foot of the DACT and connected by a one (1) inch conduit. Cable termination will be performed by NC State.
- K. A minimum of two levels of security shall be required at the FACP for addressable systems.
- L. Install equipment per manufacturers environmental requirements.

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M. Power for the FACP, DACT and all remote power supplies and printer shall be from the emergency power panel. Each shall be served by a dedicated circuit.

N. All signal appliances, shall be field selectable ANSI S3.41, three-pulse temporal pattern. Audible signal level shall be field adjustable, with 101 dbA high level and 96 dbA low level. Sound level based upon anechoic dBA at 10 feet.

O. System outages for occupied buildings

1. The Contractor shall notify NC State prior to any work to contacts/interface with any alarm detection devices (smoke detectors, pull stations, horns, panels, etc.). If any disabling, disconnection, reconnection of fire alarm system equipment is necessary, the Contractor shall notify NC State at least five (5) working days prior to proposed work. Work cannot proceed until contractor receives written approval from NC State.
2. Disabling or disconnection shall be limited to one (1) working day per outage. The Contractor shall be liable for any costs, direct or indirect, due to false alarms resulting from Contractor's work.

P. Air handling units controlled by FACP shall be de-energized directly by the FACP during alarm shutdowns. Fire alarm device relays and Building Automation Systems shall not be used for alarm shutdowns of air handling systems.

Q. Rolling fire doors shall be equipped with electric motor controls interfaced with the FACP.

R. Spare Parts

1. The following spare parts shall be provided to NC State prior to final acceptance of system:
 - a) Fuses- two (2) of each size used in the installed system..
 - b) MPS- w/ monitor modules – Minimum one (1) or 2% of total installation.
 - c) Audio-visual devices – Minimum one (1) or 4% of total installation.
 - d) Indoor strobe only devices – Minimum one (1) or 4 % of total installation.
 - e) Exterior indicating devices – Minimum one (1) or 2% of total installation.
 - f) Spot Smoke Detectors – Minimum one (1) or 6% of total installation.
 - g) Spot heat/thermal detectors – Minimum one (1) or 6% of total installation.
 - h) Spot detector bases – Minimum one (1) or 2% of total installation.
 - i) Spot detector sounder bases – Minimum one (1) or 6% of total installation.
 - j) Relay modules – Minimum one (1) or 4% of each total installation.
 - k) Monitor modules – Minimum one (1) or 4% of total installation.

NC State University Design and Construction Guidelines

Division 26 Fire Alarm Systems

l) Isolation modules – Minimum one (1) or 4% of total installation.

S. Documentation provided shall be complete and provided to NC State at the time of acceptance, and shall include all necessary information to support the above stated functions. Manuals shall be bound, and published, consisting of the following:

1. Installation Manual
2. Operator/User's Manual
3. Technical Manual
4. Programming Manual

T. Spare Parts

1. The following spare parts shall be provided to NC State prior to final acceptance of system:

- a) Fuses- two (2) of each size used in the installed system..
- b) MPS- w/ monitor modules – Minimum one (1) or 2% of total installation.
- c) Audio-visual devices – Minimum one (1) or 4% of total installation.
- d) Indoor strobe only devices – Minimum one (1) or 4 % of total installation.
- e) Exterior indicating devices – Minimum one (1) or 2% of total installation.
- f) Spot Smoke Detectors – Minimum one (1) or 6% of total installation.
- g) Spot heat/thermal detectors – Minimum one (1) or 6% of total installation.
- h) Spot detector bases – Minimum one (1) or 2% of total installation.
- i) Spot detector sounder bases – Minimum one (1) or 6% of total installation.
- j) Relay modules – Minimum one (1) or 4% of each total installation.
- k) Monitor modules – Minimum one (1) or 4% of total installation.
- l) Isolation modules – Minimum one (1) or 4% of total installation.

U. Documentation provided shall be complete and provided to NC State at the time of acceptance, and shall include all necessary information to support the above stated functions. Manuals shall be bound, and published, consisting of the following:

1. Installation Manual
2. Operator/User's Manual
3. Technical Manual
4. Programming Manual

**FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems**

Building Name/Location: _____
Installing Company: _____
Observation By: _____ **Date:** _____ **Time:** _____

PRIOR TO INSPECTION

- | | YES | NO | N/A |
|-----------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|
| 1 Building Occupants, Authorities and Alarm Monitoring Co Have Been Notified | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 FACP Manufacturer and Panel is Approved for NCSU Campus | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 Installer/Programmer Has Been Certified Within the Last (2) Years to Install the FACP | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 Battery Calculations Have Been Submitted | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 Received NFPA 72 Certification Inspection and Testing Form from Fire Alarm Installer | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 Received Printer Print Out of 100% Device Test with Addresses | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 Received Sensitivity Test for Each Smoke Detector | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 Received Copy of Contractor System Response Matrix | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 Received Copy of Contractor Layout System Mapping (EST Only) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10 Program was Downloaded to Disk and Reinstalled from That Disk | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11 Installer/Programmer Shall be NICET Level 2 (Minimum) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12 Company Shall be NICET Level 4 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**If Any of the Above Items Have Not Been Obtained, the Observation Cannot Proceed
Fire Alarm System Installation and Configuration**

OBSERVATION

Conduit and Wiring:

- | | YES | NO | N/A |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|
| 1 Insulated Throat Connectors and All Conduits are 3/4 Inch | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 No Set Screw Raceway Connectors | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 No PVC Conduits (Interior or Exterior) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 All Junction Boxes Covered and All Screws are in Place | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 All Junction Boxes, Extension Rings and Metal Covers Painted RED | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 Each Conduit Length is Securely Fastened in Place at Least every 10'. In Addition, Each Conduit Shall Be Securely Fastened Within 3' of Any Box or Cabinet | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 Boxes Containing a 120V Circuit has Green Ground Wire and is Bonded to an Unpainted Surface Grounding Terminal | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 Conductor for Signal and Notification Circuits are Continuous Runs (No Splices) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 All Field Wiring in the System is Labeled Where Attached at the FACP, AND in Each Terminal Cabinet & Legend on Terminal Cabinet Door on Every Floor | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10 All Circuits are Properly and Securely Terminated. Termination Blocks are Approved for the Number and Size of Wires Connected at Each of it's Terminals. Approved Wire Connector Connectors. Terminal Strips are Securely Attached to the Junction Box; No Floating Strips | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11 The Feed and Return Loops are Class 'A' Circuits in a Separate Conduit for Each End of Line Notification Circuit. Do Not Combine Loop Notification Conductors into Same Conduit Except Where Permitted by the Specifications | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12 The Supply and Return Conduits Shall have (3) Feet of Separation Between Them | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13 There are (2) Hinged and Labeled FATCs Per Floor | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems**

- 14 All AC, FACP, Communicator, SNAC, Etc Circuits are Fed from Emergency Circuits (If Available)
- 15 All Wiring Color Codes per DOI Specifications. No More than 360° Bend in Conduit

Pull Station, Smoke/Heat Detectors and Audio/Visual Devices:

- | | YES | NO | N/A |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|
| 1 Confirm All Devices are Located as per Approved Fire Alarm Shop Drawings | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 A/V Devices are Installed within 15' Max of each End of Same Corridor | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 A/V Devices Do Not Exceed 100; Between Devices (Regular Shaped Corridor) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 A/V Candela Ratings Match Approved Fire Alarm Shop Drawings | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 Label Each Device and End of Line Notification Devices, Label with the Circuit Number | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 Confirm all Devices are Labeled per NCSU Guidelines to Include All Characters Necessary to Disable/Enable Devices. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 Smoke/Heat Detectors are Installed within 15' Max of Each End of Same Corridor | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 Smoke Detectors are Installed Approximately 30' OC, Do Not Exceed 30' | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 Smoke Detectors are Not Located within 3' of a Supply or a Return Air Diffuser or Further if The Air Flow is Affected | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10 Smoke Detectors are Located within 5' of Both Sides of a Corridor Fire Door | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11 Wall-Mounted Smoke Detectors are Located Between 4" and 12" from Ceiling | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12 All Strobe Flashes are in Synch (Entire Building) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13 Pull Stations are Located at each Place of Natural Egress and within 5' of Exit | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14 Smoke Detectors are Installed within 15' of FACP, Boosters and Sub-Panels | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15 Smoke Detectors (With the Exception of Duct and Elevator Smokes) have a Maximum 30 Second Alarm Verification Enabled | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16 Smoke Detectors Shall Not Have a Pre-Alarm Feature | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17 Pull Station Shall be at a Height that Complies with ADA | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18 All Addressable Devices Shall Be Installed in a Conditioned Space, Not Above Ceiling and with LEDS Visible from Floor. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Duct Detectors:

- | | YES | NO | N/A |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|
| 1 Confirm All Devices are Installed as Per Approved Submittals and Detail Drawings | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 Confirm All Devices are Labeled (Loop #, Device #) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 Confirm Each Duct Detector Intake Tube has it's Holes Facing into the Air Stream and A Stopper in the End of the Tube. If Tube is Over 36', it Will Have Rear Supports. If the End Penetrates through the Duct, the Duct Shall be Sealed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 Confirm at each Duct Detector, A 12"x12" Minimum Access Door is Provided for Cleaning and Inspecting the Tube. Verify Air Flow Direction is Permanently Indicated on Duct | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 Confirm each Duct Detector has a Remote Alarm Indicator Light (RAIL) and Key Test Switches in the Nearest Corridor or Public Space @ 80" AFF, Unless this is Above Ceiling, Must be In Air Conditioned Space | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 Confirm Return Side Device in Units Greater than 2,000 CFM | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 Confirm Supply Side Device in Units Greater than 15,000 CFM | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 No Duct Detectors Installed on Roof | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 Duct Detectors Shall be Mounted Upstream from or Before Humidifier | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems**

Electrical Panel TVSS for FACP:

YES NO N/A

1 Each Circuit that Powers Fire Alarm Equipment (FACP, Communicator, SNAC, Etc) Shall Have a Surge Protector. The Surge Protector Should be a Series Type as Prescribed by DoI Guidelines

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2 Confirm Surge Protector has 5-10 Loops on the Load Side Power Circuit per DOI

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

3 Confirm Panel has a Green Ground Wire and it is Bonded to an Unpainted Surface on a Grounding Lug in the Box

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

4 Confirm Fire Panel Circuit is Labeled in Panel and a Breaker Lock-on Device is Installed and that the Breaker Handle is Painted Red

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

5 Each Circuit that Powers Fire Alarm Equipment (FACP, Communicator, SNAC, Etc) Shall have a Lock-on Device Installed on it's Breaker

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

TVSS for DC Circuits that Extend Outside the Building:

Note: Requirements Similar to those Above are also Required for PIV Monitoring, Etc, as Noted in DOI Guidelines, Surge Protection, Caulk Entry Pipe into Bldg Behind Devices

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

Digital Alarm Communicator:

YES NO N/A

1 Cabinet is Labeled with 'DAC' on an Engraved Plastic Laminated Sign on Front Exterior of Panel

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

2 Panel is Labeled Outside of Door with Room #, Panel #, Circuit #

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

3 Is 120V Present Inside of Communicator. If Yes, the Hinged Door and Panel Box Enclosure Shall be Grounded from the Power Source. DO NOT use the Circuit Board Chassis as a Central Grounding Point Provide a Separate Ground

ALL PAINT MUST BE REMOVED AT ALL GROUNDING POINTS ON METAL SURFACES

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

4 Confirm all Wiring and Phone Lines are Labeled

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

Fire Alarm Control Panel, SNAC Panel & Battery Cabinet:

YES NO N/A

1 The Door and Panel Box Shall be Grounded from the Power Source. DO NOT use the Circuit Board Chassis as a Central Grounding Point Provide a Separate Ground

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

ALL PAINT MUST BE REMOVED AT ALL GROUNDING POINTS ON METAL SURFACES

2 Cabinet Labeled as Appropriate with an Engraved Plastic Laminated Sign on Front Exterior of Panel

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

3 Confirm Power Circuit is Labeled Outside on Panel Door

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

4 Confirm Separation of SLC, NAC and 120V Circuits.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

5 Confirm all SLC, NAC 120V, Telephone Line 1 and 2 are Labeled per Manufacturer's Specs

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

6 Confirm All Conduit Connectors in Panel are Insulated Throat Type

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

7 Confirm Batteries are Dated

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

8 Confirm Operation Instruction Summary is Framed and Mounted at the FACP and Annunciator Panel

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

9 Confirm Zone Directory is Framed and Mounted at the FACP and Annunciator Panel

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

10 Confirm Smoke Detector & SNAC Panels are Located within 15' of the FACP and in the Same Room as Panels

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

11 Building with 100 or more Addressable Devices or with (3) or More Occupied Floors Shall have a Printer Installed on Approved Shelf or Table

Confirm There is a Printer Installed on an Emergency Circuit

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

**FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems**

- 12 Is There a LED Annunciator Installed
- 13 On New & Existing AHU Confirm Defeat Switch Provided at the FACP
(Which Causes a Trouble on the FACP When Abnormal)

Fire Alarm Testing and Operation:

- | | YES | NO | N/A |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|
| 1 Is FACP in Normal Operation Mode with No Troubles | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 Perform an LED Lamp Test. Do All LED Lamps Light up? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 Disconnect Each Telephone Line One at a Time to Verify Line Failure Alarm to Monitoring Company Within One Minute | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Reconnect Line After Each Test, Clear Trouble from Panel Before Proceeding | | | |
| 4 Request Contractor to Unscrew Each End of Line Device from the Wall in Each NAC Circuit for Verifying Battery Voltages During Test, Per Test Procedures Below | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 Disconnect Battery to FACP; Verify Trouble on Panel Within One Minute | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Reconnect Batter to FACP | | | |
| 6 Perform Batter/Current Test, (2) Digital Meters are Required (1) to Measure Current (1) to Measure Voltage | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 All Troubles Activate the DAC after a One (1) Minute Delay | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

NAC Test Procedure AV Devices

Turn off A/C Power. While on Battery Power Initiate an Alarm Condition. Test Battery Voltages at FACP is Approximately (13) Volts and Not Differ more Than (0.4) Volts Between Each Battery

Install (1) Digital Meter to Read in-line Currents
Provide (1) Digital Meter to Read Voltages

STARTING VOLTAGE AND CURRENT TEST

FACP

				<u>End of Line Device</u>
Battery (1)	_____	VDC		
Battery (2)	_____	VDC		
Batteries 1&2 in Series	_____	VDC		
Card Output NAC1	_____	VDC	_____	_____ VDC
Card Output NAC2	_____	VDC	_____	_____ VDC
Card Output NAC3	_____	VDC	_____	_____ VDC
Card Output NAC4	_____	VDC	_____	_____ VDC

SNAC #

Battery (1)	_____	VDC		
Battery (2)	_____	VDC		
Batteries 1&2 in Series	_____	VDC		
Card Output NAC1	_____	VDC	_____	_____ VDC
Card Output NAC2	_____	VDC	_____	_____ VDC
Card Output NAC3	_____	VDC	_____	_____ VDC
Card Output NAC4	_____	VDC	_____	_____ VDC

SNAC #

Battery (1)	_____	VDC		
Battery (2)	_____	VDC		
Batteries 1&2 in Series	_____	VDC		
Card Output NAC1	_____	VDC	_____	_____ VDC

FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems

Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC

SNAC #

Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC

SNAC #

Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC

Batteries Shall Not Exceed Voltage Drop of (3) Volts from the NAC Card Output Terminal to the End of Line Device for Each Loop. If Voltage Drop is More Than (3) Volts the Test Will Stop, and the System Fails.

(30) MINUTE VOLTAGE AND CURRENT TEST

FACP

End of Line Device

Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC

SNAC #

Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC

SNAC #

Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC

FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems

Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC
<u>SNAC #</u>			
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC
<u>SNAC #</u>			
Battery (1)	_____ VDC		
Battery (2)	_____ VDC		
Batteries 1&2 in Series	_____ VDC		
Card Output NAC1	_____ VDC	_____ Amps	_____ VDC
Card Output NAC2	_____ VDC	_____ Amps	_____ VDC
Card Output NAC3	_____ VDC	_____ Amps	_____ VDC
Card Output NAC4	_____ VDC	_____ Amps	_____ VDC

Batteries Shall Not Exceed Voltage Drop of (3) Volts from the NAC Card Output Terminal to the End of Line Device for Each Loop. If Voltage Drop is More Than (3) Volts the Test Will Stop.

Test Procedure Continuation

	YES	NO	N/A
1 Request Mapping Chart Layout to Test Isolation Modules, Modules Shall be Installed After a Maximum of (25) Devices in Each Addressable Loop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 Confirm Addressable Loop Controller Circuits are Class 'A' Type with Contractor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 Confirm Isolation Modules are Installed at the FACP on Both the Outgoing and Return Conductors of Each Loop (Minimum of (3) Per Loop)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Confirm Each Isolation Module is Labeled as 'Isolation Module' and State it's Loop #.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 If Speakers are Installed, are all Shields Tested Free of Grounds & Continuity Good from One End to the Other.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Request Contractor to Reconnect 120V Power Source to FACP and Reset Panel to Normal Status	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 Request Contractor to Place an 'Open' in the '+' and '-' SLC/NAC, to Test the Power Supervision. Panel Should Indicate a Trouble in Each. This Shall be Performed Between Each Isolation Module in Each Loop, Minimum of (2) Locations, Maximum Determined by ISO Quantity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 Request Contractor to Place an 'Short' in the '+' and '-' SLC/NAC, to Test the Power Supervision. Panel Should Indicate a Trouble in Each. This Shall be Performed Between Each Isolation Module in Each Loop, Minimum of (2) Locations, Maximum Determined by ISO Quantity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9 Request Contractor to Place a 'Ground Fault' in the '+' and '-' SLC/NAC, to Test the Power Supervision. Panel Should Indicate a Trouble in Each. This Shall be Performed Between Each Isolation Module in Each Loop, Minimum of (2) Locations, Maximum Determined by ISO Quantity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems**

- 10 Request Contractor to Reset Panel to Normal □ □ □
SLC Test Procedures, Smoke, Heat, Duct Detectors, Pull Stations, Etc
- 1 Initiate Alarm on Devices By Operating Pull Stations, Blowing Smoke in Detectors (No Magnets), Smoking Duct Detectors and Flowing Water to Trip Flow Switches, and Tampers YES NO N/A
□ □ □
- 2 Confirm Each Address, Device Descriptor Type and Location is Correct on the Contractor Zone Map and on the FACP Display for Each Device Being Tested □ □ □
- 3 Confirm During Test, Operation of Audible-Visual Alarm Notification Appliances. Audible Must be 15dBA Above Normal Ambient Sound Levels in All Occupiable Areas of the Building □ □ □
- 4 Indoor Strobes Must Flash (60) to (120) Times per Minute □ □ □
- 5 Sounder Base Detectors. Request Contractor to Place an 'open' in the '+' and '-' to Test the Power Supervision. Panel Should Indicate a Trouble in Each □ □ □
- 6 Request Contractor to Place a 'Short' in the '+' and '-' to Test the Power Supervision. Panel Should Indicate a Trouble in Each □ □ □
- 7 Request Contractor to Place a 'Ground Fault' in the '+' and '-' to Test the Power Supervision. Panel Should Indicate a Trouble in Each □ □ □
- 8 Confirm During Test, Operation of HVAC Shutdown and Also Closure of Fire Doors. (A) HVAC Shutdown Must Occur Within (20) Seconds, Except for Gas Packs that Must be Arranged for up to (50) Seconds to Protect the Heat Exchanger □ □ □
- 9 Confirm Any Outside A/V Appliances for Operation & That they Silence on Panel Silence Command. Also, these Devices Sync with the Building A/V's □ □ □
- 10 Place an Open in the '+' and '-' of Any Auxiliary (24) Volts that Power any External Equipment such as Beam Detectors, (4) Wire Duct Detectors, Etc to Verify Proper Supervision. Panel Should Indicate Trouble □ □ □

Sprinkler System

- YES NO N/A
- 1 Confirm Operation of Waterflow Alarm Switches by Flowing Water from Inspectors Test Connection(s). Alarm Latches Within (20-45) Seconds, and Any Outside Motor Water Gong Rings in Less Than (15) Seconds □ □ □
- 2 Inspector Test Discharge Flow is Limited to a (1/2") Stream by Using a Sprinkler Head Minus the Deflector □ □ □
- 3 Request Contractor to Close any Supervised Control Valve, to Verify Supervisory Signal at the FACP within (2) Turns. Reopen to Verify 'restore' Signal. □ □ □
- 4 Request Contractor to Close Post Indicate Valve (PIV), to Verify Supervisory Signal at the FACP within 1/5 (2) Turns of the Valves Mechanical Traveling Distance. Reopen to verify 'Restore' Signal □ □ □
- 5 If Dry Pipe or Pre-Action System, Request Contractor to Demonstrate that the Waterflow Alarm Functions by Flowing Water Throught the Test Valve to Activate the Water Gong □ □ □
- 6 Request Contractor to Place Air Pressure Pump in Low (PSI) and High (PSI) to Verify Supervisory Signals to FACP □ □ □
- 7 Is Design Data Plate Mounted on Riser System Identifying all Pressures and Flow Information □ □ □
- 8 Is Sprinkler Drawing Holding Tube (3" Round Diameter) Mounted on the Wall. Plans Must be Easily Removed Without Obstructions & Include the DOI Approval Letter □ □ □
- 9 Does PIV Have a Lock Installed □ □ □

**FIRE ALARM SYSTEM CHECKLIST
For Addressable Systems**

- 10 Does PIV Monitoring Circuit have a Surge Protection device, that Meets DoL Guidelines, Installed. Surge Protector must be Grounded per Manufacturer's Instructions
- 11 Does the Exterior Hotbox have a Heater Installed
- 12 The Heater Circuit and the Low Temp Circuit are in (2) Separate Conduits
- 13 Does the Exterior Hotbox have a Low Temperature Alarm
- 14 The Low Temperature Circuit Goes Straight to the DAC with N.O. Contacts
- 15 The Fire Alarm Devices are Liquid Tight and Mounted Up and Out of the Way of any Water Spray-Specifically Area by Backflow Testing Connections.

Pre-Action System

- 1 The PAS is Installed in the Same Manner as the Main FACP
- 2 The Pumps Associated with the System are on an Emergency Circuit with Lock

**Fire Extinguishing System
Commercial Kitchen Hood**

- 1 Each Fire Extinguishing System, on a Commercial Kitchen Hood is Connected to the FACP to Activate the Fire Alarm System. Request the Contractor to Demonstrate that this Functions Properly, by Manually Operatin the Monitoring Switch Without Releasing the Extinguishing Agent
- Note:** If the Extinguishing System is a Wet Type, the Fire Alarm Activation must Shut Off the Gas if Present and Also Operate a Shunt Trip Breaker to Shut off ALL Electric Power to the Appliances Under the Commercial Kitchen Hood. The Exhaust Fan(s) Keep Running But the Make-up Air Must Shout Down. These Functions are to be Done Directly from the Fire Extinguishing System, Not the FACP

**Fire Extinguishing System
Single Range Residential Kitchen Hood**

- 1 The Fire Extinguishing System on a Residential Kitchen Hood is Connected to the FACP to Activate the Fire Alarm System if Equipped with a Local Suppression System. Request the Contractor to Demonstrate that this Functions Properly by Manually Operating the Monitoring Switch, without Releasing the Extinguishing Agent
- Note:** If the Extinguishing System is a Wet Type, the Fire Alarm Activation Must Shut Off the Gas if Present and also Operate Shunt Trip Breakers to Shut off the Stove/Range and the Hood Fan. These Functions are to be Done Directly from the Fire Extinguishing System, Not the FACP.
- Note:** If the Stove/Range is Equipped with Low Heat Elements No Protection is Required

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APPENDIX D
INDEX OF DRAWINGS

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INDEX OF DRAWINGS

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A101	RENOVATION ENLARGED FLOOR PLANS
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E111	RENOVATION ELECTRICAL LIGHTING PLANS
FA101	ENLARGED FIRE ALARM PLANS

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 PROJECT DESCRIPTION

- A. The Project is for the alteration and renovation of NC State University McKimmon Center toilet rooms. The Work scope includes asbestos abatement, selective demolition, and general construction, plumbing, HVAC, and electrical, including fire alarm.
- B. The Project Owner is the State of North Carolina through North Carolina State University.
- C. McKimmon Center will remain occupied and operational during University business hours throughout the duration of the Work. It is the responsibility of the Contractor to plan and sequence the work so as to allow ongoing operations during business hours. The Contractor is to do so in close coordination with the Owner and Architect.
- D. Construction is to be sequenced in up to four phases, as depicted on the plans. The third and fourth phases are bid alternates. The construction sequence is to proceed in numerical phase order, starting with Phase 1.
- E. All work to be performed after hours when McKimmon Center is not occupied; GC to provide a bid alternate price for the time.

1.02 WORK BY OWNER TO BE COORDINATED BY CONTRACTOR

- A. During construction, the Owner will provide and install room signage within the Project. Contractor is to include time for these Owner activities within its Project Schedule, and endeavor to coordinate the Work with these activities.
- B. During construction, the Owner will provide indicated toilet accessories for installation by the Contractor.
- C. During construction, the Owner will provide a waste dumpster for use by the Contractor. Owner will be responsible for removal and disposal of dumpster contents at the project's conclusion. Contractor shall use its own means and methods for waste collection and disposal of all hazardous waste. Owner's dumpster shall not be used for hazardous waste.
- D. After Substantial Completion, Owner will install waste receptacles and compost bins.

1.04 CONTRACTOR USE OF SITE AND PREMISES

- A. Work may only be undertaken within the phase currently under construction. Work in subsequent phases may not begin until the preceding phase has been declared Substantially Complete by the Designer and accepted by the Owner.
- B. Construction operations within the building are limited to the restroom area currently under construction. No other interior areas may be encumbered by the Work.
- C. No exterior material storage is allowed except within designated staging areas.
- D. All interior material staging and storage is limited to the area of Work currently under construction.
- E. The Contractor may only use the rear loading dock entrance for normal construction

traffic. All other entrances are reserved for University staff and visitors at all times, except during emergency.

- F. The corridors are to remain open and unobstructed at all times during normal business hours. All Work causing an obstruction to a corridor must occur outside of University business hours. All such obstructions must be removed, and a clear exit path restored, prior to resumption of University business hours.
- G. Contractor is to erect temporary, full height partitions, access door and install temporary toilet room directional signage to nearby toilet facilities.
- H. Contractor is to provide and install temporary, illuminated exit lighting if the temporary barriers block occupant's line of sight to existing exit luminaires.
- I. Contractor must follow all University policies regarding safety and protection of people and objects.
- J. Access to University loading zones and dumpsters should remain open during construction. If access needs to be blocked, notify the University PM 24-hours in advance. The University PM will work directly with WRR at 5-9421 and/or University Transportation to make arrangements for alternate access to service area and dumpsters. ncstone@ncsu.edu
- K. Contractor must follow all University policies regarding transportation and parking. Refer to: <http://www2.acs.ncsu.edu/trans/parking/specialty.html>.
- L. Contractor is to follow University policy for "Hot Work" and is to obtain a permit for all such work. Contractor shall access the following website to obtain hot work permits: http://www.ncsu.edu/ehs/fire/hot_work.htm.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.02 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.03 SCHEDULE OF ALLOWANCES

- A. Quantity Allowances are established for each item as follows:

1. Self-leveling Cast Underlayment: Materials and installation to cover 500 square feet of existing concrete slab on grade at an average thickness of $\frac{1}{4}$ inch. Allowance includes underlayment and primer.
2. Electrical Junction Box Cover Plates: Materials and installation of (40) forty metal cover plates over existing un-covered 4-inch junction boxes.
- 3.

END OF SECTION

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SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for unit prices.
 - 1. A unit price is an amount proposed by Bidders and stated on the Bid Form as a price per unit of measurement for materials or services that will be added to or deducted from the Contract Sum by Change Order in the event the Work required by the Contract Documents are increased or decreased.
 - 2. Unit prices include all necessary equipment, labor, material, overhead, profit and applicable taxes.
 - 3. Unit prices shall remain valid for the duration of the Project Schedule through Substantial Completion.

- B. Schedule: A "Unit Price Schedule" is included at the end of this Section.
 - 1. Any work performed without prior authorization by the Owner's representative specifically designated for this role shall be classified as incidental work and shall not be included in the measurement of quantities for payment.
 - 2. Work-in-place that involves use of established unit prices shall be measured by an independent surveyor or other agent, acceptable to the Contractor, selected by and paid by the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 UNIT PRICE SCHEDULE

- A. Unit Prices shall be established as follows:
 - 1. Self-leveling Cast Underlayment: Underlayment and primer at an average thickness of ¼ inch. Per square foot.
 - 2. Electrical Junction Box Cover Plate: Installation of a metal cover plate over existing un-covered 4-inch junction box. Per plate.
 - 3. WWM-reinforced concrete slab on grade removal and replacement at an average thickness of four-inches. Per square foot

END OF SECTION

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SECTION 01 23 10

ALTERNATIVES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Bid Alternate submission procedures.
- B. Owner's Preferred Brand Bid Alternates.
- C. Documentation of changes to Contract Sum and Contract Time.

1.02 ACCEPTANCE OF ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. No priority order should be assumed by the bidder.
- B. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- C. Coordinate related work and modify surrounding work to integrate the Work of each accepted alternative.

1.03 ALTERNATE TYPES

- A. All Bid Alternates are intended to be "Additive" to the base bid.
- B. Owner's Preferred Brand items are identified as bid alternates to specified items.
- C. Drawings typically illustrate the Bid Alternate as if this work were in the Project Scope. Refer to narratives in this Section and Drawing notes for base bid conditions.

1.04 SCHEDULE OF ALTERNATES

- A. Alternates shall be established as follows:
 - 1. #1 – Renovation of Phases 3 & 4 Restrooms 102, 108, 118 and 124.
- B. Owner's Preferred Brand Alternates shall be established as follows:
 - 1. # 2 - Provide Door Closers by LCN.
 - 2. # 3 - Provide Power Door Operators by LCN.
 - 3. # 4 - Provide Napkin Dispenser & Disposal by Bobrick.
 - 4. # 5 - Provide Baby Changing Stations by Koala Kare.
- C. Identify Bid Alternate costs on Bid Proposal Form.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01 34 00

SUBMITTALS

PART 1 – GENERAL

1.01 SUBMITTALS

- A. The contractor is responsible for the minimum submittals identified below, as applicable. Include full documentation, including product data, samples where appropriate, detailed performance comparisons and evaluation, testing laboratory reports where applicable, coordination information for effect on other work and time schedule, cost information for proposed change order, Contractor's general certification of recommended substitution, location of the intended installation of each item, and similar information germane to circumstance.
- B. Submittals During Contract Award and Mobilization Period:
 - 1. List of Subcontractors: Within 15 days after bid opening, by apparent low bidder and others as requested by the Owner.
 - 2. Executed Agreement and supporting documents prior to Notice to Proceed with work.
 - 3. Certificates of Insurance prior to any work on the site.
 - 4. Construction Schedule: Prior to preconstruction conference.
 - 5. Schedule of Values: Within 30 days after execution of the Agreement and prior to first application for payment.
- C. Submittals During the Construction Period and Prior to Substantial Completion:
 - 1. Shop Drawings, Samples, and Certification of Materials:
 - a. General: Prior to purchase, fabrication, shipment to the job site, or installation.
 - b. Prior to fabrication, the Contractor shall submit for review complete assembly drawings which show and dimension each major component of equipment and identify all materials of construction, sizes of principal members, location of electrical motor and controller connections for conduit layout.
 - c. The Contractor shall verify by written statement on the cover sheet of each submittal that the proposed product or equipment complies with the Contract Documents. Clearly list any exception to specification items on the shop drawings.
 - d. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

- e. 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.
 - f. 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.
 - g. Submittals for items specified as a package, group, or system shall be made as a single bound submittal.
- 2. Applications for Partial Payment: Submit monthly if work is performed.
 - 3. Insurance Renewal Certificates: Submit prior to expiration of previous certificate.
 - 4. Documentation related to change orders as required.
 - 5. Monthly Progress Report:
 - a. Meeting minutes from previous monthly progress meeting.
 - b. Summary of Work progress during the past month.
 - c. Summary of Work scheduled for following month.
 - d. List of RFI's and status.
 - e. List of Submittals and status.
 - f. List of Supplemental Instructions received
 - g. List of current construction contract value, Change Order requests and Change Orders approved.
 - h. Two (2) days prior to the monthly progress meeting, submit report electronically to Architect in both PDF and MS Word or Rich Text file format.
 - i. Deliver hardcopies to the Owner and Architect at the monthly progress meeting.

D. Submittals Prior to Project Closeout:

- 1. See requirements found elsewhere in Division 1.

PART 3 – PRODUCTS (NOT APPLICABLE)

PART 4 – EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A. Contractor shall provide temporary services and facilities for use by all construction personnel as well as the Architect and Owner's field representatives, except as otherwise herein specified. Do not remove temporary facilities until authorized use of permanent facilities.

1.02 USE CHARGES

- A. Water, sewer, and electrical utilities used within the building during construction shall be provided and paid for by the Owner.
- B. Usage charges for temporary facilities and utilities other than stated above shall be paid by the Contractor.
- C. Refer to the General and Supplementary Conditions of the Contract as well as University Guidelines and Policies.

1.03 REGULATIONS AND LIMITATIONS

- A. Comply with requirements of the University, local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities.
- B. The Contractor shall be limited to work within the property limits of the site and shall be responsible for and take necessary precautions to avoid damage to all adjacent property in strict accordance with University policies.

1.04 TEMPORARY UTILITY INSTALLATION

- A. Temporary Heat: Provide temporary heat where needed for performance of work, for curing or drying of recently installed work or for protection of work in place from adverse effects of low temperatures or high humidity. Provide UL or FM tested and labeled heating units known to be safe and without adverse effect upon work in place or being installed. Maintain a minimum temperature of 45 degrees F (7 degrees C) in permanently enclosed portions of the building and areas where finished work has been installed.
 - 1. Except where use of the permanent heating system is available and authorized, provide properly vented self-contained LP gas or fuel oil heaters with individual space thermostatic control for temporary heat. Do not use open burning or salamander type heating units.

1.05 SANITARY FACILITIES

- A. Sanitary facilities include temporary toilets for all construction personnel.
 - 1. Supply toilet tissue, paper towels, paper cups and similar disposable materials as appropriate for each facility. Provide appropriate covered waste containers for used material.
 - 2. Toilets: Install single occupant self-contained toilet units of the chemical, aerated recirculation or combustion type, properly vented and fully enclosed with glass fiber reinforced polyester shell. Use of pit-type privies will not be permitted.
 - 3. Use of existing facilities is prohibited.
- B. Drinking Water: Provide tap-dispenser bottled-water type drinking water units for all construction personnel.

1.06 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Maintain site in a safe, lawful and publicly acceptable manner. Contractor and each subcontractor shall be responsible for security of their own materials and facilities.
- B. Sidewalks shall remain open and accessible during construction. Should sidewalks require closure, an accessible and safe temporary (concrete, asphalt or plywood) pedestrian path around construction shall be required if an alternative accessible route is not close by.

1.07 BARRICADES, WARNING SIGNS AND LIGHTS

- A. Comply with recognized standards and code requirements for erection of substantial, barricades where needed to prevent accidents. Paint with appropriate colors, graphics and warning signs to inform personnel at the site and the public, of the hazard being protected against. Provide lighting where needed, including flashing red lights where appropriate.
- B. Erect and maintain temporary barricades to limit public access to hazardous areas. Whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic barricades will be required. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

1.08 FENCING

- A. Provide temporary fencing around any exterior staging areas to control access by unauthorized people. Fencing must be installed to be able to restrain a force of at least 250 pounds against it.
- B. Comply with University Guidelines and Policies.

1.09 EMPLOYEE PARKING

- A. Contractor employees shall be responsible for parking of its privately owned vehicles in compliance with University Guidelines and Policies. If this area is not within reasonable walking distance of the construction site, the Contractor shall provide a means for transporting his workers to the construction site that is acceptable to the Owner. Contractor employee parking must not interfere with existing facility use or other University transportation.

1.10 MAINTENANCE OF TRAFFIC

- A. Conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic except with written permission of the Owner at least 7 calendar days prior to the proposed modification date.
- C. Conduct work so as to minimize obstruction of traffic, and maintain traffic on at least half of the roadway width at all times. Obtain approval from the Owner prior to starting any activity that will obstruct traffic.
- D. Provide, erect, and maintain, at Contractor's expense, lights, barriers, signals, passageways, detours, and other items that may be required by the University.
- E. Maintain and protect traffic on all affected roads during the construction period. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment the work, and the erection and maintenance of adequate warning, danger, and direction signs, will be as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property. Minimize the interference with public traffic on roads selected for hauling material to and from the site. Investigate the adequacy of existing roads and their allowable load limit. Contractor is responsible for the repair of any damage to roads caused by construction operations.

1.11 DUST CONTROL

- A. Dust control methods and procedures must be used so as to not interfere with the ongoing building occupancy and adjoining facilities and grounds. Treat dust abatement on access roads with applications of calcium chloride, water sprinklers, or similar methods or treatment.

1.12 MAINTENANCE

- A. Operate and maintain temporary services and facilities in good operating condition and in a safe and efficient manner until removal is authorized. Do not overload services or facilities. Protect from damage by freezing temperatures and similar elements. Do not

allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.

1.13 TERMINATION AND REMOVAL

- A. Remove each temporary service and facility promptly when need has ended, or when replaced by use of a permanent facility, but no later than Substantial Completion. Complete, or, if necessary, restore permanent work delayed because of interference with the temporary service or facility. Repair damaged work, clean exposed surfaces and replace work which cannot be repaired.
- B. At Substantial Completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during the construction period.

1.14 SAFETY MEASURES

- A. In addition to complying with safety requirements set forth in the General Conditions, the Contractor shall:
 - 1. Inform himself of and fully comply with all applicable requirements of the Williams-Steiger Occupational Safety and Health Act of 1970 in the performance of work required under this contract.
 - 2. The Contractor shall adhere to the rules, regulations, and interpretations of the Secretary of the Department of Labor relating to safety and health for construction which are hereby incorporated into these requirements.
 - 3. Follow all rules set out in the regulations and recommendations published by the Associated General Contractors and the North Carolina Department of Labor, and the Contractor shall use every effort to safeguard life and property throughout his operations.

1.15 CONSTRUCTION SIGNAGE

- A. Project signs are not allowed.
- B. Provide directional signs for building occupants directing them to other toilet facilities within building. The University shall approve the design of the sign and the sign text prior to fabrication.
- C. Signage shall be professionally-crafted.
- D. Signage shall be properly erected so as to resist wind-loads, and maintained in good condition throughout the work.

END OF SECTION

SECTION 01 60 00

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. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Instructions to Bidders: Product substitution procedures prior to bid date.

1.03 REFERENCE STANDARDS

- A. 16 CFR 260 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; current edition.
- B. CAN/CSA Z809 - National Standard for Sustainable Forest Management; CSA International Inc.; 2002 (R2007).
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

PART 2 - PRODUCTS

2.01 NEW PRODUCTS

- A. General:
 - 1. Manufacture parts to U.S.A. standard sizes and gauges.
 - 2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
 - 3. When equipment is expected to generate or be subjected to movement, ensure that parts are fabricated to withstand anticipated shock and vibratory loads.
 - 4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
 - 5. Modify standard products as necessary to meet performance Specifications.
- B. Provide new products unless specifically required or permitted by the Contract Documents.

- C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions in same or similar manner.
- D. Do not use products having any of the following characteristics:
 - 1. Made using or containing CFC's or HCFC's.
 - 2. Made of wood from newly cut, old-growth timber.
- E. Where all other criteria are met, Contractor shall give preference to products that:
 - 1. Are extracted, harvested, and/or manufactured closer to the location of the project.
 - 2. Have longer documented life span under normal use.
 - 3. Result in less construction waste.
- F. Sustainably Harvested Wood:
 - 1. Definition: Wood-based materials include but are not limited to structural framing, dimension lumber, flooring, wood doors, finishes, and furnishings that are permanently installed in the project. Wood and wood-based products not permanently installed in the project are not included in the definition.
 - 2. Specific Wood-Based Fabrications: Fabricate of sustainably harvested wood when so specified elsewhere.

2.02 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, and software of types and in quantities specified in individual specification sections.
- B. Special Tools and Accessories: Furnish to Owner, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to the following:
 - 1. Adequate oil and grease.
 - 2. Integral light bulbs.
 - 3. Fuses.
 - 4. Hydrant wrenches.
 - 5. Valve keys.
 - 6. Handwheels.
 - 7. Chain operators.
 - 8. Special tools.
 - 9. Other parts as required for initial operation.
- C. Deliver and place in location as directed; obtain receipt prior to final payment.

2.03 SOURCE QUALITY CONTROL

- A. Where Specifications call for factory testing to be witnessed by Engineer, notify Engineer not less than 14 days prior to scheduled test date, unless otherwise specified.
- B. Calibration Instruments: Bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- C. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

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. Include side by side performance and aesthetic comparison of both specified product and proposed substitution.
- 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 that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require substantial revision to the Contract Documents.
- E. Substitution Submittal Procedure:
 - 1. Submit one copy of request for substitution for consideration. Limit each request to one proposed product 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 Architect/Engineer will document approved product substitutions in written form. Product substitutions that are not approved will not result in any action on the part of the Architect/Engineer.
- F. When indicated in the contract documents, the term "Or Equal" shall have the following meaning: To possess same performance qualities and characteristics, and fulfill the utilitarian function without any decrease in quality, durability, or longevity. No inference that items must be identical in all respects, if above conditions are met.

3.02 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Transport and handle products in accordance with manufacturer's instructions.
- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 FIELD FINISHING

- A. In accordance with Division 9 and individual Specification sections.

3.04 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

3.05 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

3.06 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Prevent contact with material that may cause corrosion, discoloration, or staining.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

J. Hazardous Materials:

1. The Contractor is to maintain a 3-ring binder containing a regularly updated index of chemicals and Material Safety Data Sheets (MSDS) at the Site. Include MSDS sheets for all chemicals being used on the project. Update MSDS's for new chemicals as each new chemical arrives.
2. Prevent contamination of personnel, storage area, and Site. Meet requirements of product specification, codes, and manufacturer's instructions.

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SECTION 01 73 29

CUTTING AND PATCHING

PART 1- GENERAL

1.01 DEFINITIONS

- A. "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.
- B. Refer to other sections of these specifications for specific cutting and patching requirements and limitations applicable to individual units of work.

1.02 STRUCTURAL WORK

- A. Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio. Submit proposal and request and obtain Engineer's approval before proceeding with cut-and-patch of structural work.

1.03 OPERATIONAL/SAFETY LIMITATIONS

- A. Do not cut-and-patch operational elements and safety components in a manner resulting in decreased performance, shortened useful life, or increased maintenance.

1.04 VISUAL/QUALITY LIMITATIONS

- A. Do not cut-and-patch work exposed to view (exterior and interior) in a manner resulting in noticeable reduction of aesthetic qualities, as judged by the Architect taking into consideration the specific Work conditions.
- B. Engage qualified personnel skilled in cutting, patching, removal, and replacement of specialized equipment and finish surfaces.
- C. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.

1.05 LIMITATIONS ON APPROVALS

- A. The Architect's or Engineer's approval to proceed with cutting and patching does not waive right to later require removal/replacement of work found to be cut-and-patched in an unsatisfactory manner, as judged by the Architect taking into consideration the specific Work conditions.

1.06 WARRANTY

- A. Replace, patch, and repair materials and surfaces cut or damaged by methods and with materials in such a manner as not to void any required or existing warranties.

PART 2 - PRODUCTS

2.01 MATERIALS GENERAL

- A. Use materials for cutting and patching that are identical to existing materials. If identical materials are not available or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Before cutting, examine surfaces to be cut and patched and conditions under which the work is to be performed. Meet at the Project site with parties involved in cutting and patching, including mechanical and electrical trades, to review areas of potential interference and conflict. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

3.02 TEMPORARY SUPPORT

- A. To prevent failure, provide temporary support of work to be cut.

3.03 PROTECTION

- A. Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations.
- B. Avoid interference with use of adjoining areas or interruption of free passage to adjoining area.
- C. Take precautions not to cut existing pipe, conduit, or duct serving existing building or equipment but scheduled to be relocated until provisions have been made to bypass them.
- D. Schedule cutting so that subsequent Work in the same area immediately follows cutting operations.
- E. Avoid cutting openings that are potential locations for intrusion of water, vermin, dust or other deleterious substances.

3.04 CUTTING

- A. Use the cutting methods that are least likely to damage work to be retained or adjoining work. Where possible, review proposed procedures with the original installer; comply with original installer's recommendations.
- B. Where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut and drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

3.05 PATCHING

- A. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
- B. Restore exposed finish of patched areas, and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.
 - 1. Patch all concrete slab areas to leave flush smooth patch even with adjacent existing surfaces. Grind and/or use leveling compounds to match existing slab.
 - 2. Where removing walls or partitions extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 3. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken area surface contain the patch after the area has received primer and second coat.

3.06 REPAIR OF DAMAGE

- A. Repair equipment and finish surfaces damaged as the result of the work of this contract to the satisfaction of the Owner or replace with new material at no additional cost to the Owner.

3.07 CLEANING

- A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty or similar items. Thoroughly clean piping, conduit and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

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SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Appendix B – NCSU Waste Management Plan and Forms

1.02 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction waste.
 - 2. Recycling nonhazardous construction waste.
 - 3. Disposing of nonhazardous construction waste.

1.03 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 65 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste

management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Construction Waste:
 - a. Masonry and CMU.
 - b. Lumber.
 - c. Wood sheet materials.
 - d. Wood trim.
 - e. Metals.
 - f. Roofing.
 - g. Insulation.
 - h. Resilient flooring
 - i. Carpet and pad.
 - j. Gypsum board.
 - k. Acoustical ceiling panels
 - l. Piping.
 - m. Electrical conduit.
2. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - a. Paper.
 - b. Cardboard.
 - c. Boxes.
 - d. Plastic sheet and film.
 - e. Polystyrene packaging.
 - f. Wood crates.
 - g. Plastic pails.

1.05 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed.

1.06 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Qualification Data: For waste management coordinator.

1.07 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of waste management coordinator.

2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.08 WASTE MANAGEMENT PLAN

- A. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste. Include estimated quantities and assumptions for estimates.
- B. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
- C. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste. Include the following:
 1. Total quantity of waste.
 2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.

3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 1. Comply with operation, termination, and removal requirements in Section 01 50 00 "Temporary Facilities and Controls."
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 1. Distribute waste management plan to everyone concerned within three Insert number days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 2. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, and environmental protection.

3.02 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.03 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.

2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Section 329300 "Plants" for use of clean sawdust as organic mulch.
- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
 - a. Comply with requirements in Section 329300 "Plants" for use of clean ground gypsum board as inorganic soil amendment.

3.04 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

3.05 WASTE MANAGEMENT FORMS

- A. See Appendices for University standard waste management forms.

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SECTION 01 78 00

CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and other Division-1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Inspection procedures.
 - 2. Project record document submittal.
 - 3. Operating and maintenance manual submittal.
 - 4. Submittal of warranties.
 - 5. Final cleaning.
- B. Other closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 46.

1.03 PRELIMINARY SUBMISSIONS

- A. Submit the following for approval prior to submission of Application for Payment that equates to a Total Completed and Stored to date amount equaling 90% of the Contract Sum to Date and prior to requesting a final review for certification of Substantial Completion.
 - 1. Operating and Maintenance Preliminary Submission: Reference Section 01 78 23 O-M Documentation General
 - 2. Submittals and Shop Drawings copies for Owner: Submit a complete set of legible Contractor approved, Architect reviewed, submittals and shop drawings in PDF on transferrable media. All such submittals shall be in a single bound PDF and shall be indexed and bookmarked in accordance with University standard requirements.

1.04 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion and before submitting an Application for Payment that equates to a Total Completed and Stored to date amount equaling 95% of the Contract Sum to Date,

complete the following:

1. Project Observation Reports: Contractor shall maintain copies of Architect's field reports at the site. Final review for Substantial Completion will not be scheduled until all reported items are in compliance or are scheduled for completion.
 2. Contractor's Final Inspection: Contractor shall fully inspect the work with Contractor's project manager, superintendent and subcontractor's managers to verify that the work is ready for Architect's final inspection.
 3. Contractor will inspect the Work and issue typewritten pre-final punchlist. Contractor must correct each non-complying item. Contractor will document correction of each item by initialing approval, dating, and sending Architect copy of initialed items. It is the Contractor's responsibility to manage the proper structural and technical installation of all exposed finishes. The Contractor must also assure the quality of the workmanship of all finishes. Do not wait, for or attempt to, use Architect's final inspection to identify unacceptable quality workmanship.
- B. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
1. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 2. Advise Owner of pending insurance change-over requirements.
 3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
 4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
 5. Submit final project photographs, damage or settlement survey, property survey, and similar final record information.
 6. Deliver tools, spare parts, extra stock, and similar items.
 7. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
 8. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
 9. Submit Operating and Maintenance Documentation in accordance with Section 01 78 23.
- C. Final Inspection Procedures: For each portion of the Work to be deemed as Substantially Complete the Architect will perform one continuous pre-final inspection. The Architect's pre-final inspection shall occur only after the Contractor has completed the Work, conducted their own pre-final inspection, have created their own pre-final punch list, and

have requested a pre-final inspection. On receipt of a request for pre-final inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of Work that must be completed or corrected before the certificate will be issued. Results of the Architect's pre-final review will form the initial punchlist.

1. Incomplete work by the Contractor or work that is not of quality, in the opinion of the Architect, will delay the final inspection until that work is completed or corrected throughout. The Architect performing routine field reviews will be the sole judge of readiness for the final inspection. Routine field reviews by the Architect and/or a pre-final inspection of a pre-arranged sample building area will identify incomplete or non-complying items, all of which must be corrected throughout entire contract area prior to requesting a final inspection.
2. The final inspection will be a single continuous effort for each portion of the Work put forth by the Contractor as Substantially Complete. Contractor shall have all finishes complete, building clean, roof complete, windows in place and all plumbing, fire protection, mechanical and electrical systems completely operational. Contractor shall provide ladders, scaffolds, keys, drop cord lights, swing stages or other equipment and manpower necessary to complete the final inspection in a timely manner. Contractor's project manager and superintendent will accompany the Architect at all times during the final inspection. Contractor will identify each room by contract document number on temporary tape on door hinges. Tape will remain until every item on punchlist is corrected and then be removed by Contractor. Contractor will bring bound field reports, specifications, addenda, construction change directives, change orders and record prints along on final inspection.
3. Correct or complete all non-complying items.
4. Submit copies of the final punchlist of itemized work to be completed or corrected. Contractor's project manager or superintendent must inspect, approve and initial completion or correction of each punchlist item.
5. Punchlist Inspection: The review of the punchlist will also be a single continuous effort for each portion of the Work put forth by the Contractor as Substantially Complete.

1.05 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
 1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit As-Built documents to Owner.
5. Submit lien waivers in a format acceptable to the Owner.
6. Deliver attic maintenance stocks and overruns of materials at one time to location(s) designated by the Owner. Submit inventory lists and obtain written acceptance from the Owner.
7. Submit to Architect a Final Project Tally Sheet in both PDF and MS Word or RichText file format indicating original Contract Price and Time, all changes to Price and time made by Change Order, and final Contract Price and Time.

1.06 AS-BUILT DOCUMENT SUBMITTALS

- A. General: Do not use as-built documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect's reference during normal working hours.
- B. As-built Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
 1. Mark as-built sets with a distinguishable color.
 2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
 3. Organize as-built drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
 4. Record Product Data: Where applicable, mark Product Data submittal to show significant variations in actual Work performed in comparison with information submitted. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation.
- C. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 FINAL CLEANING

- A. General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
 - 1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped, broken or scratched glass and other damaged transparent materials.
 - c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface. Clean all sidewalks thoroughly.
- C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
 - 1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION

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SECTION 01 78 23

OPERATIONS AND MAINTENANCE DOCUMENTATION GENERAL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall provide Owner with Documentation for the safe and effective Operation and Maintenance (O&M) of the systems and equipment listed. O&M Documentation requirements included in other Sections of this Specification are in addition to, and do not replace, those required in this Section.

1.02 SUBMITTALS

- A. Preliminary Submittal: Two (2) copies of the draft manuals shall be submitted; one copy to each of Owner and Architect for review within two (2) weeks of Substantial Completion. One copy will be returned to the Contractor within ten (10) days after submittal and, if required, shall be revised and resubmitted by the Contractor within fifteen (15) days.
- B. Final Submittal: Four (4) complete sets of manuals and electronic copies shall be furnished to Owner prior to the anticipated date of Final Completion.

PART 2 - GENERAL

2.01 PURPOSE

- A. The Operation and Maintenance manuals are for the training of, and use by, Owner's employees in the operation and maintenance of the systems and equipment as specified below. The manuals shall consist of instruction on systems and equipment. A separate manual or set of manuals shall be prepared for each class of components, equipment or systems as specified.

2.02 FORMAT

- A. Bind manuals in durable, locking, 3-ring binders. Binders shall be white view-type binders with clear plastic overlays to allow insertion of title pages for binder identification.
- B. Use 8-1/2" x 11" sheets, except that larger sheets up to 11" x 17" may be used when double folded to this size and used as a pull-out. Documents which are larger than 11" x 17" shall be reduced to 11" x 17" for inclusion in the manuals except where this compromises legibility (for drawings that are to scale, add a graphic scale prior to reduction). Documents that cannot be reduced will be folded and inserted in plastic envelopes inserted in the binders so that the folded documents are securely bound into the binders. Loosely inserted documents or documents inserted into pockets in the inside covers of the binders shall not be acceptable.

- C. Each binder shall be labeled on both cover and spine to indicate project name and Owner's project number, submitting contractor, date, general contents, volume number and total number of volumes in set.
- D. At the front of each binder include the following information:
 - 1. Master Table of Contents (TOC), identifying chapter headings and numbers, for all O&M Manual volumes provided by the submitting contractor
 - 2. Detailed TOC for the current volume listing, in order, the sections and subsections within each chapter of that specific manual
 - 3. Contact sheet for the submitting contractor listing appropriate contact names, addresses, phone numbers, and email addresses
 - 4. Introduction: including a brief description of project and purpose of the manual.
- E. Manuals shall be divided into chapters based on specification sections. Chapters shall be identified using both the specification section number and name (i.e. 23 21 23 Hydronic Pumps). Manual chapters shall be further subdivided into sections and sub-sections as appropriate for clarity of organization and to facilitate use by Owner.
 - 1. Chapters shall be separated by index tabs labeled with the covered specification name and number. Chapter division tabs shall be identical to each other in style and appearance, but different than the section division tabs.
 - 2. Major sections within a chapter shall be separated by index tabs, which indicate the equipment or material covered. Section division tabs shall be identical to each other in style and appearance, but different than the chapter division tabs.
 - 3. Provide a complete bill of materials in matrix format.
- F. In addition to the hard copy O&M manuals, provide two (2) full set of electronic O&M manuals for each set of hard copies, in searchable PDF format on DVD/CD.

2.03 CONTENT

- A. Each chapter shall contain the following, information in addition to the requirements specified elsewhere in these specifications.
 - 1. Contact list identifying vendors providing equipment and systems covered in the current chapter. This information shall include vendor name, address, name of contact person(s), phone numbers (including 24 hour service numbers where appropriate), and email addresses.
 - 2. Equipment/material schedule(s) for all covered equipment and systems showing equipment identification (tag) number, manufacturer, model number, serial number, quantities, area/system served, equipment location, etc.
 - 3. Safety Precautions. This subsection shall comprise a listing of safety precautions and instructions to be followed during operation and before, during, and after repairs or adjustments are made.
- B. Each chapter shall describe the procedures necessary for Owner's personnel to operate and maintain the systems and equipment covered in that chapter.

- C. References shall be made, as appropriate, to drawings, schematics, sequences of operation and other information included as part of the construction contract drawings and specifications that show distribution system layout, equipment arrangements and items of control.
- D. All information included in the final O&M Manuals, including equipment schedules, manufacturer's literature, drawings, etc. shall represent the "as-built" condition.
- E. Manufacturer's literature and other information provided in the O&M Manuals shall be for the actual equipment installed under contract for the particular facility. Where literature (standard product catalogs, cut-sheets, etc.) contains data pertaining to parts, equipment or options other than those specifically provided for this project, the contractor shall clearly indicate the specific products, model numbers, and options provided. Mark-ups made by the contractor for this purpose shall be made in a manner that will clearly photocopy (no highlighters).
- F. A brief description of each type of required information follows:
 - 1. Warranty information
 - a. Provide copies of all warranty certificates from equipment manufacturers
 - b. If not included on warranty certificate, provide the start/end dates of warranty period, descriptions of what is and isn't covered and contact information for warranty claims (if different from contact list described above).
 - c. Provide information of an operations or maintenance nature covering warranty items that have not been discussed elsewhere.
 - 2. Product Information
 - a. Provide manufacturers' standard, published product literature describing covered materials, equipment and devices including illustrations, exploded views, dimensions, weights, application data, etc.
 - d. Where manufacturer's product information (catalog cut-sheets, etc.) contain data pertaining to parts, equipment or options other than those specifically provided for this project, the contractor shall clearly indicate the specific products, model numbers, and options provided. Mark-ups made by the contractor for this purpose shall be made in a manner that will clearly photocopy (no highlighters).
 - e. Provide manufacturer's standard, published Installation, Operation & Maintenance bulletins pertaining to the specific equipment installed.
 - f. Provide performance curves and rating data, specific to the equipment installed on the project such as fan and pump curves, chiller selection sheets, sound data, etc.
 - g. Provide a copy of all approved shop drawings covering approval of equipment for the project with the product information. Include all data concerning changes made during construction.

3. Preventive Maintenance Procedures & Schedules
 - a. Provide written preventive maintenance procedures describing each required PM task. Procedures shall include lists of tools and parts required and all safety precautions to be taken.
 - b. State, preferably in tabular form, the recommended frequency for each preventive maintenance task: (cleaning, inspection, lubrication, scheduled overhauls, etc.). Task schedules shall be grouped and sorted by frequency (daily, weekly, quarterly, annually, etc.)
 - c. Procedures for lubrication of equipment shall indicate both the type and quantity of lubricant to be used.
 - d. If periodic inspection of equipment is required for operation, cleaning, or other reasons indicate the items to be inspected and give the inspection criteria.
 - e. Provide instruction for the proper handling, disposal and/or removal of hazardous or otherwise special materials.
 - e. Provide instruction for minor repairs or adjustments required for preventive maintenance routines. Minor repair and adjustment shall be limited to repairs and adjustments that may be performed without special tools or test equipment and that require no special training or skills. Identify test points and give values for each.
4. Corrective Maintenance Procedures
 - a. Corrective Maintenance: Corrective maintenance instructions shall be predicated upon a logical effect-to-cause troubleshooting philosophy and a rapid replacement procedure to minimize equipment downtime. Instructions and data shall appear in the normal sequence of corrective maintenance, for example, troubleshooting first, repair and replacement of parts second, and then the parts list.
 - b. Troubleshooting: This information shall describe the general procedure for locating malfunctions and shall give, in detail, any specific remedial procedures or techniques. The data shown are intended to isolate only the most common equipment deficiencies. Troubleshooting tables, charts, or diagrams may be used to present specific procedures. A guide to this type shall be a three-column chart. The columns shall be entitled Malfunction, Probable Cause, and Recommended Action. The information shall be alphabetically arranged by component, and each component shall, in turn, list deficiencies that may be expected. Each deficiency shall contain one or more problems with a recommended correction.
 - c. Repair and Replacement: Indicate the repair and replacement procedures most likely to be required in the maintenance of the systems and equipment. Information included here shall consist of step-by-step instructions for repair and replacement of defective items. Include all information required to accomplish repair or replacement, including

information such as torque values. Identify all tools, special equipment, and materials that may be required. Identify uses for maintenance equipment. The paragraphs shall contain headings to identify the topics covered.

5. Spare Parts Lists.
 - a. Provide a list of all spare parts for the covered equipment. The parts list shall include a tabulation of descriptive data for each part including part number and manufacturer. Where available, provide an exploded diagram of the equipment identifying parts listed in the spare parts list.
 - b. Provide a list of recommended spare parts to be kept in inventory by the Owner's maintenance staff for performance of preventive maintenance and typical corrective maintenance tasks.
6. Factory Test Reports
 - a. Provide copies of factory test reports specified in the covered section of the specifications.
 - b. Test reports should include a brief description of the test procedures used, test date, names of personnel performing test, names of personnel witnessing test (if any), test results and comparison of test results with specified acceptance criteria.
7. Field Test Reports
 - a. Provide copies of field test reports specified in the covered section of the specifications. Samples of field testing include, but are not limited to, HVAC test and balance, leak testing of piping and ductwork and megger testing of electrical distribution systems.
 - b. Test reports shall clearly indicate the type of test performed, test procedures used, system being tested, section or area of equipment being tested, date of test, signatures of personnel performing and witnessing the test, test results and comparison of test results with specified acceptance criteria.
 - c. Service contacts: (Provide both, typewritten and electronic format)
 - 1) Service and supplier contacts shall be developed for all provided equipment and systems for easy reference by operating and maintenance personnel.

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SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Selective building demolition, excluding removal of hazardous materials and toxic substances.
- B. Selective demolition of site elements, including plant and landscape materials.
- C. Selective demolition of building elements for alteration purposes.
- D. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Appendices and Division 01 Specification Sections, apply to this Section.
- B. Section 01 11 00 - Summary: Limitations on Contractor's use of site and premises.
- C. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- D. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- E. Section 02 82 13 – Abatement Removal Scope of Work.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2009.

1.04 SUBMITTALS

- A. See Section 01 34 00 - Submittals, for submittal procedures.
- B. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
 - 1. Minimum of 5 years of experience.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 SCOPE

- A. Remove portions of existing building and site as noted.
- B. Remove other items indicated, for salvage, relocation, and recycling as indicated.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Sequence demolition to accommodate Owner's ongoing, continuous building operation around the area of work.
- B. Perform the work in Phases as indicated. Only the work of a single Phase may be performed during any given Phase. Areas of work in other phases must remain intact for Owner's use.
- C. Provide a minimum of 48 hours notice to Owner before any utility service interruption. Do not proceed with service interruption without written approval of Owner.
- D. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Comply with applicable requirements of NFPA 241.
 - 3. Use of explosives is not permitted.
 - 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 5. Provide, erect, and maintain temporary barriers and security devices.
 - 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 8. Do not close or obstruct roadways or sidewalks without permit.

- E. Do not begin removal until receipt of notification to proceed from Owner.
- F. Protect existing structures and other elements that are not to be removed.
 - 1. Provide temporary bracing and shoring as necessary.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if structures appear to be in danger.
- G. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- H. Hazardous Materials: Comply with 29 CFR 1926 and state and local and Owner regulations.
- I. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Dismantle existing construction and separate materials.
 - 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.03 EXISTING UTILITIES

- A. Coordinate work with Owner; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt building utilities without the written approval of the Owner.
- D. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on Owner's Existing Record Documents.
 - 1. Verify that construction and utility arrangements are as shown.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- C. Remove existing work as indicated and as required to accomplish new work.

1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 2. Remove items indicated on drawings.
- D. Services (Including but not limited to HVAC, Plumbing, Fire Alarm, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
1. Verify that abandoned services serve only abandoned facilities before removal.
 2. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- E. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
 4. Patch as specified for patching new work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 02 82 10

ABATEMENT PROJECT COORDINATION

1.01 GENERAL

- A. All Abatement Contractors will be licensed General Contractors in either the specialty interior, building, unclassified or asbestos categories by the North Carolina Licensing Board of General Contractors and limited for the bid amount.
- B. Prior submitting a bid, all Abatement Contractors shall be responsible for inspecting the site in order to confirm the Scope-of-Work. Any quantities listed on the Drawings or in the Specifications are done so to provide approximations to the Scope of Work. A determination as to the actual quantities of asbestos-containing materials (ACM) to be abated is the responsibility of the bidding Abatement Contractor.
- C. The Abatement Contractor shall furnish and will be responsible for all costs including, but not limited to: permit fees, containment preparation, labor, materials, services, insurance, bonding, and equipment necessary to carry out the abatement processes and disposal activities in accordance with the Drawings and Specifications. The Abatement Contractor shall comply with EPA, OSHA and all State and local government regulations and ordinances.
- D. The Abatement Contractor has and assumes the responsibility of working in such a manner that he/she offers his/her employees workplace free of recognized hazards causing or likely to cause death or serious injury. The Abatement Contractor will be responsible for performing the scheduled abatement and disposal activities such that airborne asbestos fiber levels do not exceed established levels.
- E. The Abatement Contractor will be responsible for all costs associated with employee exposure monitoring to meet the requirements of the OSHA regulations.
- F. The Abatement Contractor is responsible for all costs, including any cost incurred for additional site visits by the Designer and/or the Industrial Hygiene Firm as a result of a failed final inspection. Notification and scheduling of the final inspection during the project is the responsibility of the Abatement Contractor. The Abatement Contractor will be required to allow a minimum notice of 48-hours unless the Designer, Industrial Hygiene Firm and the Abatement Contractor agree upon a different time frame.

1.02 PERSONNEL

- A. Abatement Supervisor(s)
 - 1. The Abatement Supervisor shall be licensed and accredited by the Health Hazards Control Unit (HHCU) of the North Carolina Department of Health & Human Services (DHHS).

2. The Abatement Supervisor shall have, at a minimum, two years experience in the administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc.
 3. One Abatement Supervisor shall be provided for every ten (10) Workers inside the containment.
 4. The Abatement Contractor shall have at least one employee on the jobsite in either a foreman or supervisor's position who is bilingual in the appropriate language(s) when employing workers who do not speak fluent English in the containment.
 5. A minimum of one Abatement Supervisor shall have attended a "24 hour" respiratory protection training course.
- B. Worker(s)
1. All Workers shall be licensed and accredited by HHCUC.
- C. Competent Person
1. A Competent Person, as defined in the OSHA Asbestos Standard 29 CFR 1926.1101, employed by the Abatement Contractor must be outside the work area at all times to monitor activities, ensure security, provide information to Visitors, and to assist other when accessing to the work area.
- D. Employees
1. The Abatement Contractor shall be solely responsible for the behavior of the Workers, while on the jobsite. If at any time during the Contract, any of his/her employees are judged to exhibit behavior unfitting for the area or judged to be a nuisance by North Carolina State University (NCSU), Industrial Hygiene Firm or Designer, then the Abatement Contractor will be requested to immediately remove his/her employee(s) from the jobsite.
 2. The Abatement Contractor shall be responsible for compliance with the following issues relating to behavior while on the jobsite, which are as follows:
 - a. Workers are restricted to "designated" areas on the jobsite and the NCSU property.
 - b. All Workers must conform to the following basic dress code when in public areas on the NCSU Property: long pants, shirts, no tank tops, no shorts, no bare backs.
 - c. The Abatement Contractor is responsible for properly disposing of all trash brought on to property by his employees, including drink cans, bottles or other food containers and wrappers.

1.03 NOT USED

1.04 PRE-JOB SUBMITTALS

- A. Submit complete bound (3 ring binder) sets of Pre-Job Submittals and an electronic copy to the Designer at least three weeks prior to the “Start-of-Work” with the submittals requested by the architect in the project manual. The Abatement Contractor shall maintain a copy of the “approved” submittals onsite throughout the Project. Pre-Job Submittals shall include but are not limited to the following items:
1. Notifications: Provide copies of Asbestos Permit Application and Notification letters for Demolition/Renovation (DEHNR 3768), which provide written notice to all required Agencies, particularly the HHCUC. Provide notification letters to local emergency medical services (EMS), Fire and Police departments and include copies of each in the submittal package.
 2. Employee List: Provide detailed lists of Supervisors and Workers, along with their accreditation information, including their accreditation numbers, accreditation expiration date and color photograph assigned to the Project.
 3. Permits: Provide detailed information on the “State-approved” landfill, which is planned to receive bagged waste from the Project, including detailed information on the landfill’s address and certification of compliance with 40 CFR 61.154 regulations.
 4. Medical: Include individually signed and notarized forms for each employee to be utilized on the Project. Workers, Supervisor’s and other employees must be actively involved in the Abatement Contractor’s annual medical surveillance program.
 5. Respirator Training: Include copies of most recent employee fit-testing records. Documents shall contain the individual’s signatures and the type of respirators approved for use.
 6. Project Schedule: Provide Project schedule, which details the sequence of events, planned for each phase of the Project. At a minimum include information and durations (number of days and working hours) relating to the work area preparations, abatement and cleaning, waste loadout, inspection and final air clearance for each phase of work.
 7. Initial Exposure Assessment: As required by the OSHA construction asbestos standard 29 CFR 1926.1101.
 8. Any other programs or training as outlined by the OSHA and EPA standards.

1.05 POST-JOB SUBMITTALS

- A. Submit completely bound (3-ring binder) sets of Post-job submittals and an electronic copy to the Designer following the “Completion-of-Work”.
1. Waste Manifest: North Carolina Asbestos Waste Shipment Record (DEHNR 3787) receipt from landfill operator, which acknowledges the Abatement

Contractor's delivery(s) and disposal of waste material. Include date, material quantity delivered and signature of authorized representative of landfill. Also, include the name of the Waste Transporter.

2. Daily Log: A “notarized” copy of all daily logs showing the following: name, date, entering and leaving time, company or agency represented, reason for entry for all persons entering the work area, employee's daily air monitoring data as required by the OSHA standard and written comments by Inspectors, Industrial Hygienists, Abatement Designers and Visitors and photographs taken during the project.
3. Medical: Copies of worker release forms, asbestos training certification forms and respirator training documentation of “new” Workers and Employees hired or added during the Project. Do not send medical records.
4. Special Reports: All documents generated under Section 02 82 10.1.06.

1.06 SPECIAL REPORTS

- A. General: Except as otherwise indicated, submit special reports to the Abatement Designer within one (1) day of occurrence, with copies to others affected by the occurrence. Copies should also be maintained in the Project logbook.
- B. Reporting Unusual Events: When an event of unusual and significant nature occurs at the jobsite (examples: failure of negative pressure system and/or rupture of temporary enclosures), prepare and submit a special report to the Abatement Designer. The report should list the chain of events, individuals involved, and response actions performed by Abatement Contractor personnel, evaluation of results or effects, and similar pertinent information. When such events are known or predictable in advance, advise the Abatement Designer as soon as possible.
- C. Reporting Accidents: Prepare and submit accidental reports of significant jobsite accidents to the proper authorities. Record and document significant dates and response actions and comply with industry standards for reporting accidents. For this purpose, a significant accident is defined to include events where personal injury is sustained, or significant property loss, or where the event posed a significant threat of loss or personal injury.

1.07 CONTINGENCY PLAN

- A. Contingency Plan: Prepare a Contingency Plan for emergencies including fire, accident, power failure, negative pressure system failure, supplied air system failure (if applicable), evacuation of injured persons for both life threatening and non-life threatening injuries, or any other event that may require modification or abridgment to decontamination or work area isolation procedures. Include in the Contingency Plan specific procedures for decontamination or work area isolation. Note that nothing in this Specification should impede safe exiting or providing of adequate medical attention in the event of an emergency. Keep these Drawings in the onsite office.
- B. Post near the Clean Room of Personnel Decontamination Unit:
1. Telephone numbers and locations of emergency services including but not limited to Fire, Ambulance, Doctor, Hospital, Police, Power Company, Telephone Company and the North Carolina HHCU.
 2. A copy of Material Safety Data Sheets (MSDS) for any chemicals used during the Project.
 3. The Abatement Contractor shall post asbestos signs in each appropriate language as per the OSHA 29 CFR 1926.1101 Standard. English and Spanish signs are required at a minimum.

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SECTION 02 82 11

ABATEMENT DEFINITIONS, CODES AND REGULATIONS

PART 1 GENERAL

1.01 Definitions:

- A. General: Basic Contract definitions are included in the General Conditions.
- B. Indicated refers to graphic representations, notes or schedules on the Plans, or other paragraphs or schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.
- C. Directed: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Project Designer", "requested by the Project Designer", and similar phrases. However, no implied meaning shall be interpreted to extend the Project Designer's responsibility into the Abatement Contractor's area of construction supervision.
- D. Approve: The term "approved," where used in conjunction with the Architect's action on the Abatement Contractor's submittals, applications, and requests, is limited to the duties and responsibilities of the Architect as stated in General and Supplementary Conditions. Such approval shall not release the Abatement Contractor from responsibility to fulfill Contract requirements unless otherwise provided in the Contract Documents.
- E. Regulation: The term "Regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.
- F. Furnish: The term "furnish" is used to mean "supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations."
- G. Install: The term "install" is used to describe operations at Project Site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."
- H. Installer: An "Installer" is the Abatement Contractor or an entity engaged by the Abatement Contractor, either as an employee, subcontractor, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

NOTE: The term "experienced," when used with the term "Installer" means having a minimum of two (2) previous Projects similar in size and scope to this Project, being familiar with the precautions required and having complied with requirements of the authority having jurisdiction.

- I. Project Site is the space available to the Abatement Contractor for performance of construction activities, either exclusively or in conjunction with others performing other construction activities as part of the Project. The extent of the Project Site is shown on the Plans and may or may not be identical with the description of the land upon which the Project is to be built.
- J. Provide: The term, "provide" means "to furnish and install", complete and ready for the intended use.
- K. Testing Laboratory: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.02 SPECIFIC DEFINITIONS:

- A. Abatement - Procedures to control fiber release from asbestos-containing materials (ACM). Includes removal, encapsulation, enclosure, repair, demolition and renovation activities.
- B. Abatement Contractor - The individual and/or business with whom Owner contracts to perform the identified asbestos abatement work as defined in the Specifications and Plans. It is recommended that wherever asbestos abatement is part of a larger project, the asbestos work be contracted separately and distinctly from other contract work. Whenever this is not possible, the Abatement Contractor is responsible for the proper completion of project activities in accordance with this contract specification even when an Abatement Contractor has been retained as a Subcontractor to perform the actual abatement.
- C. Abatement Project Designer – EEC, Inc. – Mike Shrimanker (NC Accreditation No. 40010)
- D. ACGIH - American Conference of Governmental Industrial Hygienists
6500 Glenway Avenue, Building D-5
Cincinnati, Ohio 45211
- E. ACM – Asbestos-Containing or Asbestos-Contaminated Materials.
- F. AIHA - American Industrial Hygiene Association.
2700 Prosperity Avenue, Suite 250
Fairfax, VA 22031

- G. Airlock – An “airlock” is a system for permitting ingress and egress with minimum air movement between a contaminated area and an uncontaminated area. Typically, consisting of two curtained doorways separated by a distance of at least three (3) feet such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the second doorway, thereby preventing contamination from flowing through.
- H. Air Monitoring - The process of measuring the fiber content of a known volume of air collected during a specific period of time. The procedure utilized to collect and analyze air samples for airborne asbestos fiber concentration shall be as per the NIOSH Method 7400. For clearance air monitoring, Transmission Electron Microscopy (TEM) methods may be utilized for lower detectability and specific fiber identification. Specific types of air monitoring:
- Area Air Monitoring: The monitoring of ambient airborne fiber concentrations inside and outside the Work Area.
- Personal Air Monitoring: Representative air monitoring of fiber concentrations within the breathing zone of an employee.
- I. Air Monitor - Contracted or employed by NCSU to inspect and conduct air monitoring, sampling and analysis. Supervision of air sampling and evaluation of results shall be performed under the direct supervision of an individual certified in the Comprehensive Practice of Industrial Hygiene (C.I.H.) and having specialized experience in air sampling for asbestos. The Air Monitor must be an accredited in the State of North Carolina by the North Carolina State Asbestos Management Program (N. C. Health Hazard Control Unit). The Air Monitor is required to collect personal samples and observe the working conditions inside and outside the Work Area on a daily basis.
- J. Amended Water - Water containing a chemical wetting agent (surfactant) to improve penetration into ACMs that are being abated.
- K. ANSI - American National Standards Institute
1430 Broadway
New York, New York 10018
- L. Approved Landfill - A site for the disposal of asbestos-containing and other hazardous wastes that has been given approval by the EPA and acceptable by Owner.
- M. Architect – IBI Group, Raleigh, NC
- N. Asbestos - The term asbestos includes Chrysotile, Amosite, Crocidolite, Tremolite, Anthophyllite, and Actinolite. Materials are considered to contain asbestos if the asbestos content is at least 0.1% of the material.
- O. Asbestos-Containing Material (ACM) - Material composed of asbestos of any type and in an amount greater than one percent (1%) by weight and area, either alone or mixed with other fibrous or non-fibrous materials.

- P. Asbestos-Containing Waste Material – Materials identified to contain or is contaminated by asbestos fibers requiring disposal. Materials shall be packaged in at least two layers of poly to prevent emission of asbestos fibers during transport.
- Q. Asbestos Project Manager - An individual qualified by virtue of experience and education, designated as Owner's representative and responsible for overseeing the asbestos abatement project.
- R. ASTM - American Society For Testing and Materials
1916 Race Street
Philadelphia, Pa. 19103
- S. Authorized Visitor – NCSU representative(s) (and any designated representatives), architect any representative of a regulatory or other agency having jurisdiction over the Project, Abatement Project Designer, Consultant, CIH or representatives of Air Monitoring Firm.
- T. Building Owner – North Carolina State University
- U. Chemical Remover - A pre-mixed chemical penetrating agent designed specifically for removal of ACM.
- V. Certified Industrial Hygienist (CIH) - An industrial hygienist certified in comprehensive practice by the American Board of Industrial Hygiene.
- W. Clean Room - An uncontaminated area or room that is a part of the Worker Decontamination Unit with provisions for storage of Worker's street clothes and clean protective equipment.
- X. Containment Area - Work Area or zone which has been prepared with poly sheeting on the floor and walls, critical poly barriers over penetrations, negative air pressurizing equipment, etc., for asbestos abatement.
- Y. Curtained Doorway - A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, typically constructed by placing two overlapping sheets of plastic over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the doorway and securing the vertical edge of the other sheet along the opposite vertical side of the doorway. Other effective designs are permissible.
- Z. Decontamination Unit (DCU) - A series of connected rooms, separated from the Work Area and from each other by airlocks, for the decontamination of Workers. The facility minimally consists of an Equipment Room, Airlock, Shower, Airlock and a Clean Room.
- AA. Demolition - The wrecking or taking out of any load bearing or supporting structural member of a facility together with any related handling operations.

- BB. DHHS – Department of Health and Human Services
Health Hazard Control Unit
1912 Mail Service Center
Raleigh, North Carolina 27699-1912
Phone: (919) 707-5950
- CC. Encapsulant - A liquid material which can be applied to ACM which controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).
- DD. Encapsulation - The process of applying an encapsulant to ACM or the surfaces in which ACM have been removed and thoroughly cleaned to control the release of asbestos fibers into the air.
- EE. Enclosure - The construction of an airtight, impermeable, permanent barrier around ACM to control the release of asbestos fibers into the air.
- FF. EPA - U.S. Environmental Protection Agency
401 M. Street S.W.
Washington, D.C. 20460
- GG. Equipment Decontamination Unit - A DCU designed for controlled transfer materials and equipment into or out of the Work Area, typically consisting of a Washroom and Holding Area.
- HH. Equipment Room - A contaminated area or room that is part of the DCU with provisions for storage of contaminated clothing and equipment.
- II. Facility - Any institutional, commercial or industrial structure, installation or building.
- JJ. Facility Component - Any pipe, duct, boiler, tank, reactor, turbine or furnace at or in a facility, or any structural member of a facility.
- KK. Fixed Object - A piece of equipment or furniture in the Work Area, which cannot be removed from the area.
- LL. Friable - Any material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure, and includes previously nonfriable material after such previously nonfriable material becomes damaged to the extent that when dry may be crumbled, pulverized, or reduced to powder by hand pressure.
- MM. Furnish - The term "furnish" is used to mean "supply and deliver to the Project Site, ready for unloading, unpacking, assembly, installation, and similar operations".
- NN. Glovebag Removal Technique - A method with limited applications for removing small amounts of friable ACM from HVAC ducts, piping runs, valves, joints, elbows, and other non-planar surfaces in a non-contained Work Area. The glove bag assembly is a

manufactured or fabricated device consisting of a glove bag (typically constructed of 6-mil transparent poly or polyvinyl chloride plastic), two inward projecting long sleeves, an internal tool pouch, and an attached, labeled receptacle for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object or material to be removed and contains all asbestos fibers released during the process. All Workers who are permitted to use the glovebag technique must be highly trained, experienced and skilled in this method.

- OO. Ground Fault Circuit Interrupter (GFCI) - A circuit breaker that is sensitive to very low levels of current leakage from a fault in an electrical system.
- PP. Ground Fault Interrupter (GFI) - A device, which automatically de-energizes any high voltage system component that has developed a fault in the ground line.
- QQ. HVAC - Heating, ventilation and air conditioning system.
- RR. HEPA Filter - A high efficiency particulate air filter capable of removing particles greater than 0.3 microns in diameter with 99.97% efficiency.
- SS. HEPA Vacuum - A vacuum system equipped with HEPA filtration capable of collecting and retaining asbestos fibers.
- TT. Holding Area - A chamber in the Equipment Decontamination Unit located between the washroom and an uncontaminated area. The Holding Area comprises an airlock.
- UU. Movable Object - A piece of equipment or furniture in the Work Area that can be removed from the area.
- VV. MSDS (Material Safety Data Sheet) - OSHA Form 20 or an equivalent form containing health hazard information about chemical products.
- WW. NC-OSHA - North Carolina Occupational Safety and Health Division
214 West Jones Street
Raleigh, North Carolina 27603
- XX. Negative Pressure Ventilation System - A portable exhaust system equipped with HEPA filtration capable of maintaining constant low velocity airflow into Work Areas from adjacent uncontaminated areas. Minimum required pressure differential during the abatement activities shall be -0.02 inches of water or less.
- YY. Negative Air-Pressurizing Machine - A self-contained local exhaust machine utilized in a negative pressure air system. This equipment must use primary (HEPA) and secondary filters when used in asbestos Work Areas to collect and retain asbestos fibers in the filtering system. For extended projects the secondary filters may require replacing on a daily basis. The primary filter should be replaced to increase the efficiency of the negative air pressurizing equipment.

- ZZ. NESHAPS - The National Emission Standards for Hazardous Air Pollutants EPA Standard 40 CFR Part 61.
- AAA. NIOSH - The National Institute for Occupational Safety and Health
 CDC- NIOSH
 Building J. N.E. - Room 3007
 Atlanta, GA. 30333
- BBB. OSHA - The Occupational Safety and Health Administration
 200 Constitution Avenue
 Washington, D.C. 20210
- CCC. Outside Air - The air outside the work area, building and structures.
- DDD. Owner – North Carolina State University
- EEE. PCB - Polychlorinated biphenyls.
- FFF. Plasticize - To cover floors and walls with poly as herein specified.
- GGG. Polyethylene Sheeting (Poly) – Shall be at least 6-mil plastic sheeting and approved for use during abatement activities. Depending on the type of work being performed and the environmental conditions encountered may be fire-retardant.
- HHH. Prior Experience - Experience required of the Abatement Contractor on asbestos projects of similar nature and scope to insure capability of performing the asbestos abatement in a satisfactory manner. Similarities shall be in areas related to material composition, project size, abatement methods required, number of employees, and the engineering, work practice and personal protection controls required. Experience required of the Contractor on UST projects of similar nature and scope to insure capability of performing the UST removal and disposal in a satisfactory manner.
- III. Project Site - The space available to the Abatement Contractor for performance of construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project Site is shown on the Plans and may or may not be identical with the description of the land upon which the Project is to be built.
- JJJ. Regulated Work Area – Any Work Area where there is the “potential” to have fiber levels exceeding the OSHA permissible exposure limit.
- KKK. Removal - The stripping, chipping, sanding, sawing, drilling, scraping, sucking, and other methods of separating the material from its installed location in a building. For the UST work, Removal is defined as removal of associated piping, tank contents, soil, etc. from its installed location in the ground.
- LLL. Removal Encapsulant - A penetrating encapsulant specifically designed for use during the removal of ACM rather than for encapsulation.

- MMM. Renovation - Altering in any way one or more facility components. Operations in which load-supporting structural members are wrecked or taken out are excluded.
- NNN. Shower Room - A room between the Clean and Equipment rooms in the Decontamination Unit supplied with hot and cold or warm running water controllable at the tap and suitably arranged for complete showering during decontamination.
- OOO. Staging Area - Either the Holding Area or some area near the waste transfer airlock where containerized asbestos waste has been placed prior to removal from the Work Area. For the UST work, either the Holding Area or some area near the waste transfers where contaminated or uncontaminated soil and UST are placed prior to removal from the site.
- PPP. Supervising Air Monitor (SAM) - Supervising Air Monitor is accredited by North Carolina Health Hazard Control Unit.
- QQQ. Stripping – The complete removal of ACM from component and structural members of a facility.
- RRR. Structural Member – Shall be any load-supporting or non-supporting member of a facility, such as beams, columns, ceilings and walls.
- SSS. Surfactant - A chemical wetting agent added to water to improve penetration, normally consisting of 50% polyoxyethylene ether and 50% polyoxyethylene ester.
- TTT. Visible Emissions – Shall be any emission of airborne asbestos material that is visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.
- UUU. Visual Inspection - A walkthrough type inspection of the Work Area to detect incomplete work, damage, or inadequate cleaning.
- VVV. Waste Transfer Airlock - A section of the Waste Decontamination Unit utilized for transferring containerized waste from inside to outside of the Work Area.
- WWW. Water Filtration System - A local water-filtering system capable of trapping and retaining all asbestos fibers greater than 5 microns in size.
- XXX. Wet Cleaning - The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils, which have been dampened with water and used to extract asbestos contamination from surfaces throughout the Work Area. After use the objects would be double-bagged and disposed of as asbestos-contaminated waste.
- YYY. Work Area - Designated rooms, spaces, or areas of the project in which asbestos abatement actions are to be undertaken or which may become contaminated as a result of

such abatement actions. A contained Work Area is an area that has been sealed, plasticized, and equipped with a Decontamination Unit.

1.02 CODES AND REGULATIONS

A. REFERENCE SPECIFICATIONS

The Abatement Contractor shall assume full responsibility for compliance with all applicable Federal, State and local regulations pertaining to work practices, hauling, disposal, and protection of Workers, Visitors to the site, and persons occupying areas adjacent to the site.

Unless modified by these Specifications, all Specifications for stripping, removal, repair and disposal work shall conform to the following Specifications and Standards, as applicable, as if completely reproduced herein.

1. The following regulations published by the Environmental Protection Agency (EPA):
 - a. "National Emissions Standards for Hazardous Air Pollutants Asbestos," 40 CFR Part 61, Subpart M.
 - b. "General Provisions," 40 CFR Part 61, Subpart A.
 - c. "Guidance for Controlling Asbestos-Containing Materials in Buildings" June 1985. (EPA # 560/5-85-024).
 - d. "Asbestos-Containing Materials in Schools," 40 CFR Part 763, Subpart E including appendices.
2. The following regulations published by the U.S. Department of Labor, OSHA:
 - a. "Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite; Final Rules," Title 29, Part 1910, Section 1001 and Part 1926, Section 1101 of the Code of Federal Regulations.
 - b. "Respiratory Protection," Title 29, Part 1910, Section 134 of the Code of Federal Regulations.
 - c. Construction Industry, Title 29, Part 1926, of the Code of Federal Regulations.
 - d. "Access to Employee Exposure and Medical Records," Title 29, Part 1910, Section 20 of the Code of Federal Regulations.
 - e. "Hazard Communication," Title 29, Part 1926, Section 59 of the Code of Federal Regulations.
 - f. "Specifications for Accident Prevention Signs and Tags," Title 29, Part 1910, Section 145 of the Code of Federal Regulations.
3. The following regulations published by North Carolina State Agencies:
 - a. Occupational Safety and Health Act of North Carolina (OSHANC) North Carolina Asbestos Hazard Management Program Rules as adopted by 15A NCAC 19C.0600.
 - b. "North Carolina Occupational Safety and Health Standards for the Construction Industry," 29 CFR Part 1926 as adopted by T13 NCAC 07F.0201, and Shipyard T13:07F.0500.
 - d. North Carolina General Statutes, Chapter 95, 97, 130.

- e. The State Building Code
 - f. North Carolina Construction Manual, Division of State Construction, Department of Administration, Section 112.4 Electrical
 - g. North Carolina Administrative Code, Title 15A, Chapter 13 Solid Waste Management
4. The following documents published by the American National Standards Institute:
- a. "Fundamentals Governing the Design and Operation of Local Exhaust Systems," Z9.2-1979.
 - b. "American National Standard for Respiratory Protection Respiratory Use - Physical Qualifications for Personnel," Z88.6-1984.
 - c. "Practices for Respiratory Protection," Z88.2-1992.

1.03 SPECIFIC REQUIREMENTS (OSHA/EPA):

- A. The Abatement Contractor shall comply with the requirements of the General Industry Safety and Health Standards, 29 CFR Part 1910, and the Safety and Health Regulations for Construction, 29 CFR Part 1926, including all other standards and regulations which administer such Acts, and said requirements, standards, and regulations are incorporated herein by reference. The Abatement Contractor shall at least strictly adhere to the provisions of the following applicable documents:

1910.134 - Respiratory Protection
 1910.1200 - Hazard Communication (Employee Right-To-Know)
 1910.1020 – Access to Exposure and Medical Records
 1926, Subpart Z – Toxic and Hazardous Substances
 1926.59 – Hazard Communication
 1926.400 - Electrical
 1926.451 - Scaffolding
 1926.25/1101(L) - Housekeeping
 1926.450 - Ladders
 1910.37/.38 - Egress and Emergency Plans
 1926.28/.100-.107 - Personal Protective Equipment
 1926.27/51.950h - Sanitation
 1926.302 - Powered Hand Tools
 1926.20b - Accident Prevention
 1926.16 - Abatement Contractors Responsibilities
 1926.1101 - Asbestos, Chrysotile, Amosite, Tremolite, Anthophyllite, and Actinolite
 1926 - Safety and Health Regulations for Construction
 1926.62 – Lead Exposure in Construction Industry
 The State Building Code Compliance

NCAC, Title 15A, Chapter 13 – Solid Waste Management
 NCAC, 41C.0600 – NC Asbestos Hazard Management Program Rules
 CFR Parts 171-177 – Hazardous Materials Transportation Act
 Z9.2-1979 – Fundamental Governing Design and Operation of Local Exhaust Systems
 Z88.2 – 1992 – Practices for Respiratory Protection
 Z88.6-1984 – Respiratory Protection Respiratory Use – Physical Qualification for Personnel
 E1369-05 – ASTM “Standard for Visual Inspection of Asbestos Abatement Projects”

- B. The Abatement Contractor shall comply with 763.141 - NESHAP the National Emission Standard for Hazardous Air Pollutants, 40 CFR Part 61, Subparts A and M (revised subpart B) as applicable to asbestos.
- C. North Carolina Department of Environmental Health & Natural Resources, State of North Carolina Administrative Code, 15 NAC 2D .0525, contains procedures for preventing the emissions of particulate asbestos material to outside air, warning signs, waste disposal of ACMs and notifications requirements.
- D. The Abatement Contractor shall comply with the requirements of 40 CFR Part 761, regarding handling, transportation and disposal of Polychlorinated Biphenyls (PCBs), if applicable.

1.04 NOTICES

- A. The Abatement Contractor shall notify the following offices in writing within the time frame specified by the NESHAP regulations prior to beginning any asbestos removal operations.

- 1. State Agencies

Health Hazards Control Unit	
Division of Public Health	
<i>(Regular Mail)</i>	<i>(UPS, Fed Ex, etc.)</i>
Mail Service Center 1912	Room D-1
Raleigh, N.C. 27699-1912	5505 Six Forks Road
Raleigh, N.C. 27609	
Telephone: (919) 707-5950	Fax: (919) 870-4808

N.C. Department of Labor
 Division of Occupational Safety and Health
 4 W. Edenton Street
 Raleigh, N.C. 27603
 Telephone: 1-800-LABOR-NC or (919) 662-4602
 Fax: (919) 662-4625

2. Emergency Departments
Notify the local EMS and Police and Fire departments in writing of the type and scope of work being performed.

3. Licenses
Maintain current licenses for Abatement Contractor and accreditation for Workers and Supervisors, as required by applicable State or local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the Work of this Contract.

4. Owner – North Carolina State University

END OF SECTION

SECTION 02 82 13

ASBESTOS REMOVAL – SCOPE OF WORK

1.01 GENERAL

Prior to starting asbestos removal, the Abatement Contractor's Work Area preparations including equipment and decontamination units shall be “visually” inspected and approved by the Abatement Designer and/or Air Monitoring Firm.

The Work Area boundaries shall be determined once a determination is made on the accessible areas available at the start of the Project’s Schedule. If access is available, then the Abatement Contractor can perform the scheduled abatement work at multiple locations.

1.02. SCOPE OF WORK

- A. Asbestos in amounts greater than one percent (1%) was detected in the locations identified on the plans
- B. Asbestos Project Designer: Donnie Mercer, Jr. - NC Accreditation No. 40496

1.03 ACM PRODUCTS TO BE REMOVED

- A. The Abatement Contractor shall remove floor tiles and mastic at the identified locations on each floor in each building as per the plans and specifications.
- B. Polyethylene sheeting, tape, cleaning materials, disposable clothing and any other material(s) used inside the Work Area shall be disposed of and treated as asbestos-contaminated waste and disposed of properly.
- C. Asbestos-contaminated waste shall be double-bagged as described in Section 02 82 13.80, entitled " Project Decontamination” and properly disposed of as described in Section 02 82 33, entitled," Disposal of ACM Waste.
- D. All excess water (except shower water) shall be combined with removed material or other absorptive material and properly disposed of as per EPA regulations. Abatement Contractor will not be permitted to place filtered water in storm drains, onto lawns, or into ditches, creeks, streams and rivers. Coordinate with NCSU for the location of drainage.
- G. Perform selective demolition as required to access flooring underneath gypsum walls (sheetrock) and wood walls to complete abatement. All demolition materials must be separated before asbestos abatement is initiated.

END OF SECTION

SECTION 02 82 13.10

ABATEMENT WORKER PROTECTION

1.01 GENERAL

- A. Provide worker protection as required by Federal (OSHA), State and local standards applicable to the Work. The Abatement Contractor is solely responsible for enforcing worker protection requirements at least equal to those specified in this Section.
- B. The Abatement Contractor shall require all persons entering the Work Area to remove street clothes in the Clean Room and put on “new” disposable coveralls, “new” head cover, and a “clean” respirator equipped with “new” P-100 rated HEPA filters. Proceed through Shower Room then Equipment Room where work boots are then donned.
- C. Workers shall not eat, drink, smoke, chew gum or chew tobacco in the Work Area, Equipment Room, Loadout Area, or Clean Room.

1.02 WORKER TRAINING

- A. Train all Workers in accordance with 29 CFR 1926 and North Carolina State OSHA regulations regarding the dangers inherent in handling asbestos, breathing asbestos dust, proper work procedures and personal and area protection and as per the requirements of North Carolina Health Hazard Control Unit.

1.03 MEDICAL EXAMINATIONS

- A. The Abatement Contractor shall be responsible for providing medical examinations for Workers used during the Project. Examinations shall, at a minimum, meet OSHA requirements, as set forth in 29 CFR 1926 and applicable State Workers’ Compensation Regulations.

1.04 PROTECTIVE CLOTHING

- A. The Abatement Contractor shall provide persons authorized to enter the Work Area with an adequate number of “new” disposable coveralls and disposable head covers for all required changes to enter and exit the Work Area.
- B. Boots: The Abatement Contractor shall provide OSHA-approved work boots with non-skid soles for all Workers.
- C. Gloves: Provide OSHA-approved work gloves to Workers and require that they be worn. Do not remove gloves from work area. Dispose of work gloves as asbestos-contaminated waste at the completion of the Project.

1.05 ADDITIONAL PROTECTIVE EQUIPMENT

- A. The Abatement Contractor shall provide required respiratory protection, disposable coveralls, head covers and footwear covers for NCSU Authorized employee, Abatement Project Designer, Air Monitoring Firm and other authorized representatives who may inspect the jobsite.

1.06 DECONTAMINATION PROCEDURES

- A. Require that Workers use the following decontamination procedure whenever leaving the Work Area:
 - 1. Remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the Equipment Room.
 - 2. Still wearing respirators, proceed to the Shower Room. Showering is mandatory. Care must be taken to follow reasonable procedures when removing the respirator to avoid exposure to asbestos fibers while showering. The following procedures are required:
 - a. Thoroughly wet body including hair and face.
 - b. While still wearing the respirator, thoroughly wash body, hair, and the exterior of respirator facepiece. Use hands to protect filter from being clogged by the shower water.
 - c. Take a deep breath and hold it. Completely wet hair, face and respirator seals and remove facepiece. While still holding ones breath, remove respirator facepiece; rinse the face, and start breathing.
 - d. Thoroughly wash the facepiece of the respirator (inside and out).
 - e. Shower completely with soap and water; rinse thoroughly.
 - f. Rinse the Shower Room walls and floor of debris prior to exiting.
 - g. Proceed from Shower Room to Change Room and change back into street clothes.
 - 3. After showering, each Worker should inspect, clean and repair his or her respirator as needed. The respirator shall be dried, placed in a suitable storage bag and stored properly.

END OF SECTION

SECTION 02 82 13.11

ABATEMENT RESPIRATORY PROTECTION

1.01 DESCRIPTION OF WORK

- A. Instruct and train each Worker involved in asbestos abatement on the proper use of his respirator. Require that each Worker wear a respirator, properly fitted for his face, while in the “regulated” Work Area until final air clearance sampling has been obtained. Use respiratory protection appropriate for the fiber concentration encountered in the Work Area or as required for other toxic or oxygen-deficient situations encountered.

1.02 GENERAL

- A. Provide Workers with respiratory equipment approved by NIOSH and MSHA and suitable for the exposure level in the Work Area according to OSHA Standard 29 CFR 1926.1101 and other possible contaminants employees may encounter during the Project.
- B. Provide respiratory protection from the time the first operation involved in the project requires contact with asbestos-containing materials (including construction of decontamination units, construction of airtight barriers/barricades, and placing of plastic sheeting on walls) until acceptance of final air clearance sampling test results by the Industrial Hygiene Firm.
- C. The minimum respiratory protection for the Project during gross removal of floor tiles shall be Powered Air-Purifying Respirators (PAPR) at all times irrespective of daily air monitoring of worker exposure measured to comply with OSHA regulations and North Carolina Health Hazard Control Unit recommended guidelines.
- D. The Abatement Designer may, under certain circumstances, allow the Abatement Contractor to use a half-face respirator with replaceable HEPA filters during the final cleaning phase. However, the eight-hour TWA air sampling data must document the exposure level, and the Asbestos Contractor’s SAM must write a letter to the Abatement Designer requesting a reduction of the respiratory protection.
- F. Respirator fit-testing shall be performed, at a minimum, at the beginning of the project, any change in respiratory protection equipment, and any time during the project, if requested by the Worker or SAM. Fit-testing is to be performed by one of the methods listed in the 29 CFR 1926.1101, Appendix C.
- G. Do not allow the use of single-use, disposable or quarter-face respirators for any purpose.
- H. The Abatement Contractor may submit a new exposure assessment (as per 29 CFR 1926.1101) to the SAM with a request to downgrade to less protective respirators after gross removal of tiles is completely and all tile debris are removed from the work area. The SAM will make a recommendation to the Abatement Designer, who will issue a decision in writing to the SAM approving or denying his request. If the Abatement Contractor

disagrees with the decision, then the representative air sampling data may be reviewed by the HHCU for a final decision.

- I. The Abatement Contractor shall provide combination cartridges during mastic removal to address asbestos and chemical hazards during abatement.

END OF SECTION

SECTION 02 82 13.19

REMOVAL OF ACM FLOOR TILES AND MASTIC

1.01 GENERAL:

- A. Prepare work sites per applicable articles for specified removal contained herein. Refer to Section 02 82 13.70, entitled: "Decontamination Units" or Section 02 82 13.40, entitled: "Work Area Preparation".
- B. Submit the Material Safety Data Sheet, or equivalent, in accordance with OSHA Hazard Communication Standard (29 CFR 1910.1200) for each surfactant and encapsulating material proposed for use on the Work. Include a separate attachment for each sheet indicating the specific Worker personal protective equipment (PPE) proposed for use with the material indicated.
- C. Prior to asbestos abatement, the Abatement Contractor's equipment, Work Area and Decontamination Unit(s) will be inspected and approved by the Abatement Project Designer or his representative.

2.01 PRODUCTS:

- A. Chemical Remover: Suitable to aid in removal of ACM flooring materials.
- B. Surfactant (Wetting Agent)
 - 1. For all materials containing asbestos identified as "Chrysotile", "Crocidolite", or types other than Amosite, shall consist of soapy water mixed in a proportion of two (2) fluid ounces of liquid soap to five (5) gallons of water.
 - 2. For removal of asbestos containing mastics, use low odor mastic remover to mask the odor during abatement.

3.01 EXECUTION:

- A. The Abatement Contractor shall remove all ACM specified in Section 02 82 13 entitled, "Asbestos Removal" and drawing(s).
- B. Asbestos-containing floor tile and mastic shall be removed within an enclosure system utilizing negative air pressure system as follows:
 - 1. Preclean and prepare the Work Area(s) as specified in Section 02 82 13.40.
 - 2. The asbestos-containing floor tile and mastic shall be sprayed with water containing an appropriate wetting agent (amended water) to enhance penetration.
 - 3. A fine spray/mist of the amended water shall be applied, using spray equipment capable of providing a "fine spray mist" application, to reduce fiber release before and during removal of the asbestos-containing material(s). Allow time for water, amended water or removal encapsulant to penetrate material thoroughly.

The material shall be sufficiently saturated, without causing excess dripping, to prevent emission of airborne asbestos fibers and to comply with OSHA and NESHAP requirements. Spray the floor tile(s) repeatedly during Work to maintain wet condition and to minimize asbestos fiber dispersion and emissions.

4. Place critical seals of 6-mil polyethylene sheeting on critical penetrations into the Work Area, such as windows, doors, HVAC openings and all other necessary openings.
5. Remove the asbestos-containing floor tile and mastic from areas indicated using “wet methods”.
6. Residual floor tile mastic shall be adequately removed so that no visible stains remain. Floor tile mastic is to be (or can be) removed as a friable, regulated material.
7. Remove the floor tile in manageable quantities using straight hoes, flat bars, or any other handheld tool. Do not allow material to dry. As floor tiles are removed, simultaneously pack the material (while wet) into burlap bags and then insert each burlap bag into a waste disposal bag and seal. Clean the outside of each bag and move the sealed waste bag to the Washdown Station adjacent to the Decontamination Unit. Insert the sealed waste into a second waste bag and “gooseneck” to seal the outer waste bag prior to moving and cleaning the exterior of the bag in the loadout.
8. Removed material shall be containerized before moving to a new location for continuance of Work. Surrounding areas shall be periodically sprayed and maintained in a wet condition until visible material is cleaned up.
9. Clean all surfaces in the Work Area by wet wiping, HEPA vacuuming or washing down with hoses. Provide a filtration system to remove particles down to a size of at least 5-microns.
10. The ACM(s) shall be removed by two-man teams. There shall be a separate water source for each asbestos team in the Work Area. Before beginning the next section, the material shall be packed, while still wet, into burlap bags or cardboard boxes and then double-bagged with plastic waste bags (6-mil minimum) and placed into a suitable containers for transport. All waste disposals shall be done as per Section 8233, entitled “Disposal of Asbestos-Containing Waste Materials”.
11. All loose ACM(s) removed in the Work Area shall be bagged, sealed, and labeled properly before breaks or end of shift and all equipment shall be cleaned.
12. All floor and wall polyethylene sheeting, tape, cleaning material, clothing, and all other disposable material or items used in the Work Area shall be packed into sealable plastic bags (6-mil minimum). Each bag shall be individually sealed and placed in containers, at a minimum a second bag, suitable for transport to the landfill.
13. When chemicals are used for mastic removal, proper negative air pressure techniques shall be employed to control odor. Following the removal and

cleanup, the Work Area where chemicals have been used shall be mopped with cleaning agents to remove the odor.

14. The chemical mastic remover shall be absorbed using cat litter, cellulose material, or other applicable product. This material shall be double-bagged and the outside bag and container shall be clean before leaving the loading area. Contaminated materials may be wrapped in at least two (2) layers of 6-mil polyethylene sheeting and properly labeled, as an alternative to using plastic bags.
15. All excess water (except shower water) shall be combined with removed material or other absorptive material and properly disposed of as per Section 82 33, "Disposal of Asbestos Containing Waste Materials" or filtered, using a 5-micron filter and disposed in the sanitary sewage system. The Abatement Contractor shall NOT place water in storm drains, onto lawns, or into ditches, creeks, streams, rivers or oceans.
16. Use of a wetvac for this project can be made only under certain conditions. The wetvac must be new. It may be used for vacuuming wet material or water inside the Work Area (which is under full-containment). The wetvac must be thoroughly cleaned at the end of the project or disposed of as an asbestos-contaminated tool along with the other asbestos-contaminated waste at the end of the removal. HEPA vacuums must be on the jobsite, inside the Work Area at all times.
17. After final clean up procedures have been completed as outlined in Section 02 82 13.80, entitled: "Project Decontamination", porous substrata which can be assumed to have some degree of non-visible contamination from prior exposure shall receive a thin coat of a satisfactory encapsulating agent to seal in non-visible residue.
18. Cleanup shall be in accordance with Section 02 82 13.80, entitled: "Project Decontamination".

C. For Mastic Removal:

1. When removing asbestos-containing mastic from the floor surface, the Abatement Contractor shall use a product that meets the following criteria:
 - a. The product shall not create a hazardous waste as a byproduct.
 - b. The product shall be "no odor" mastic remover.
 - c. The product shall not contain any carcinogenic or chlorinated hydrocarbons.
 - d. Shall be approved for use by the NCSU representative and the Designer. Submit the Material Safety Data Sheet, or equivalent, in accordance with OSHA Hazard Communication Standard (29 CFR 1910.1200) for the mastic removal to be used.
2. When the Abatement Contractor is using a mastic remover, he shall protect the walls and any adjacent areas from contamination with 4-foot to 6-foot poly splashguards. The Abatement Contractor will be responsible for any damages

resulting during abatement activities and will be solely responsible for the repair cost(s).

3. When collecting the liquid solution, the Abatement Contractor may use cat litter, oil-sorb or equivalent so that no freestanding liquid will be left in the waste container (bag) or on the floor surface. Additional air changes inside the Work Area may be required to prevent migration of any odors or vapors into adjacent occupied spaces or on other floors.
4. After completing the mastic removal, the Abatement Contractor will be required to use a cleaning solution adequate to neutralize the mastic remover. Mop and rinse the floor so that no residue or odor remains. The mastic solvent and cleanser shall be compatible with any “new” adhesive product intended for use to install new flooring.

D. Disposal of ACM Waste

1. All ACM waste, floor tiles and mastic shall be disposed of as per Section 02 82 33 entitled: “Disposal of ACM Waste.”

END OF SECTION

SECTION 02 82 13.30

ABATEMENT TEMPORARY FACILITIES

1.01 GENERAL

- A. Provide temporary connection to existing building utilities or provide temporary facilities as required herein or as necessary to carry out the Work.
- B. Use qualified tradesmen for installation of temporary services and facilities. Locate, modify and extend temporary services and facilities where they will serve the project adequately and result in minimum interference with the performance of the Work.
- C. The Abatement Contractor is responsible for locking and tagging out of all power sources and HVAC equipment. The Abatement Contractor shall be responsible for all additional cost inquired for the completion of the work.

1.02 WATER SERVICE

- A. NCSU will provide water source at no expense to the contractor. The Abatement Contractor will provide required hoses to connect to the source for the work and decontamination areas.
- B. Supply hot and cold water to the decontamination unit in accordance with Section 02 82 13.70 entitled, "Decontamination Units". Hot water shall be supplied at a minimum temperature of 100 degrees Fahrenheit.
- C. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment.

1.03 ELECTRICAL SERVICE

- A. General: Comply with applicable NEMA, NEC and UL standards and governing State and local regulations for materials and layout of temporary electric service.
- B. Ground Fault Protection: Provide receptacle outlets equipped with ground fault circuit interrupters, reset button and pilot light, for plug-in connection of power tools and equipment.
- C. Provide a weatherproof, grounded temporary electric power service and distribution system of sufficient size, capacity and power characteristics to accommodate performance of work during the construction period.
- D. Install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in every area of work.
- E. Provide services of a "qualified" electrician, on a standby basis, to service electrical needs during the abatement.

- F. Provide additional power service and distribution service, consisting of individual dedicated 15 amp 120 volt circuits to electrical drops with receptacle outlets equipped with ground fault interrupt protection, color coded for the exclusive use of the Industrial Hygiene firm.

1.04 FIRST AID

- A. Provide during the Project at least one well-equipped first aid kit in the Clean Room of the Decontamination Unit.

1.05 FIRE EXTINGUISHERS

- A. Comply with the applicable recommendations of NFPA Standard 10 - "Standard for Portable Fire Extinguishers." Locate fire extinguishers where they are most convenient and effective, but provide not less than one extinguisher in the Equipment Room and Clean Room of each Work Area.

1.06 TOILET FACILITIES

- A. Provide temporary toilet facilities to be used by Abatement Contractor's employees.

1.07 PARKING

- A. Park only in areas designated by the Owner. Follow NCSU parking policy.

1.08 BUILDING SECURITY

- A. Maintain personnel onsite at all times any portion of the work areas are open or not properly secured. Secure work areas completely at the end of each day.

1.09 STORAGE

- A. Supply temporary storage required for storage of equipment and materials for duration of Project. Storage trailer and dumpsters will be maintained in areas designated by NCSU.

END OF SECTION

SECTION 02 82 13.40

ABATEMENT WORK AREA PREPARATION

1.01 GENERAL

- A. Before work begins in an area, provide an “operable” decontamination unit adjacent and/or attached to the Work Area as outlined in Section 02 82 13.70 entitled, “Decontamination Units”.
- B. Completely isolate the Work Area from other parts of the building. Each floor will be one Work Area.
- C. Temporary facilities shall be addressed as outlined in Section 02 82 13.30 entitled, “Temporary Facilities”.
- D. The Abatement Contractor shall setup the Work Area, loadout(s) and decontamination unit(s) as shown on the Drawings and in the Project Specifications. All “marked” loadout and decontamination locations may change. The Abatement Designer and/or his Designee must approve any variations. The decontamination unit(s) shall consist of at a minimum a Change Room, Shower Room and an Equipment Room as described in Section 02 82 13.70 entitled: “Decontamination Units”.
- E. The Abatement Contractor shall pre-clean the Work Area of visible debris prior to installing critical barriers and floor and wall polyethylene sheeting (poly). Items and equipment in the Work Area suspected of being contaminated with asbestos shall be thoroughly cleaned using wet methods and/or vacuum(s) equipped with HEPA filtering systems prior to being removed from the Work Area. Items and equipment, which cannot be adequately cleaned, shall be disposed of as asbestos-contaminated waste and disposed of properly.
- F. Critical Barriers: The Abatement Contractor shall thoroughly seal individual openings, penetrations and fixtures in the Work Area, including, but not limited to, heating and ventilation ducts, doorways, corridors, windows, skylights and lighting. Openings, penetrations and fixtures shall be sealed with 6-mil polyethylene sheeting taped securely in-place. If the Abatement Contractor proposes to use sealants and “firestop” materials to fill in small holes or cracks, then the Architect must approve the use of each item prior to use.
- G. Floors (if required): Apply one or more layers of 6-mil (minimum) polyethylene sheeting with joints overlapped 24-inches and taped securely. Floor polyethylene sheeting shall extend a minimum of 12-inches up the wall and secured. Multiple layers of cardboard or “fire-retardant” rubberized flooring may need to be installed below or between layers of polyethylene sheeting to isolate each floor level and minimize air migration between floors through large openings.

- H. Walls (if required): Apply one or more layers of 6-mil (minimum) polyethylene sheeting with joints lapped 24-inches and taped securely. Wall polyethylene sheeting shall overlap floor polyethylene sheeting and be taped securely. For floor tiles abatement, one layer of floor poly is required if gross removal is performed. For non-friable removal, 5' of wall poly is required during mastic removal to protect walls.
- I. Floors and walls polyethylene sheeting shall be installed in such a manner that they may be removed independently from Critical Barriers.
- J. Entrances and exits from the Work Area shall have z-flap curtain doorway barriers of polyethylene sheeting.
- K. No water may be left standing on the floor at the end of the day.
- L. Wall surfaces, finishes or coverings, etc., that in the Abatement Contractor's opinion will likely be damaged by water or that may become contaminated by Asbestos fibers, shall have additional protection. Cost for any additional protection shall be the Abatement Contractor responsibility.
- M. Any costs associated with repairing any physical damage(s) caused by oversprayed water or work area preparations (inside and/or outside the Work Area) shall also be the Abatement Contractor's responsibility.
- N. The Abatement Contractor shall establish and mark emergency and fire exits in the Work Area. Emergency procedures shall have priority over established decontamination entry and exit procedures. Audible and visible fire and emergency evacuation alarms shall be installed throughout the Work Area.
- O. The Abatement Contractor shall be responsible for checking and maintaining the integrity of the seals over Critical Barriers throughout the work.
- P. The Abatement Contractor shall notify the Abatement Designer once Work Area preparations are completed and request a "pre-work" inspection.
- Q. Post Caution Signs meeting the requirement as specified by OSHA 29 CFR 1926.1101(k)(1)(ii) at any location and approaches to locations where airborne concentrations of asbestos have the potential to exceed ambient background levels. Signs shall be posted at a distance sufficient enough to allow the reader to read the sign and take the necessary measures to avoid exposure threat. Additional signs may need to be posted following the completion of the Work Area setup.
- R. The Abatement Contractor shall be fully responsible for the shutdown and lockout of electric power throughout each Work Area. Insure safe installation (including ground fault) of all temporary power sources and equipment and comply with all applicable Electrical Code and OSHA requirements for the use of such temporary electrical systems. The Owner shall pay for all costs associated with the electric power. The following shall be the minimum lighting requirements established for the Project:

1. Ten (10) foot-candles inside the general Work Area.

The light intensity of 30-foot Candle Power shall be there on working surfaces

- S. Investigate the work area and agree on Pre-Abatement conditions with the Designer or Owner. Seal all supply and exhaust vents in the Work Area with tape and at least two layers of 6-mil poly. Also, seal any damaged seams in the HVAC system that passes through the Work Area. Remove all HVAC filters and properly dispose of the materials as asbestos-contaminated waste.
- T. All critical barriers shall be built using permanent 3/8" plywood with a minimum of two layers of poly on each side of the each barrier. All exterior layers of poly shall be 6-mil thick and black in color. Where practical, the Abatement Contractor shall have a barricade of ten (10) feet around the work area(s) and his equipment.

1.02 DECONTAMINATION ARRANGEMENT DRAWING – See Appendix A.

END OF SECTION

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SECTION 02 82 13.70

ABATEMENT DECONTAMINATION UNIT

1.01 DESCRIPTION OF WORK

- A. Provide separate personnel and equipment/loadout decontamination unit, if possible. Require that the Personnel Decontamination Unit be the only means of ingress and egress for the work area. Require that all materials exit the work area through the equipment/loadout decontamination unit. The Abatement Contractor shall comply with 29 CFR 1926.1101, specifically paragraph (j) Hygiene facilities and practices for employees.

1.02 GENERAL

- A. Personnel Decontamination Unit
 1. Provide a Personnel Decontamination Unit consisting of a serial arrangement of connected rooms or spaces, including the Clean Room, Shower Room and Equipment Room. Each shall be separated by a minimum of three curtain doorways. Require all persons without exception to pass through this decontamination unit for entry into and exiting from the Work Area. Do not allow parallel routes of entry or exit. Do not remove equipment or materials through Personnel Decontamination Unit. Provide minimum of one decontamination unit and it should be located inside the work area so as not to block any access to stairwells for emergency exits for employees in the building on other floors..
 2. Provide temporary lighting within decontamination units as necessary to reach an adequate lighting level.
 3. Maintain clean and "dry" flooring in the Clean Room. Do not allow the overflowing water from the Shower Room to escape.
 4. Damp wipe all surfaces twice after each shift change with a disinfectant solution.
 5. Provide hot and cold water, drainage and standard fixtures including an elevated showerhead as necessary for a complete and operable shower. A water hose and bucket is not an acceptable shower.
 6. Arrange water shutoff and drain pump operation controls so that a single individual can shower without assistance from either inside or outside of the Work Area.
 7. Pump Shower Room wastewater to drain. Provide 20-micron and 5-micron wastewater filters In-line to shower drain. Change filters daily or more often if necessary.
 8. If the Decontamination Unit is located within an area containing friable asbestos, provide the area with a minimum 3/8-inch plywood "ceiling" with two layers of polyethylene sheeting covering the top of the "Decontamination Unit."
 9. Visual Barrier: Where the Decontamination Unit is immediately adjacent to and within view of occupied areas, provide a visual barrier of opaque plastic sheeting so that Worker privacy is maintained and work procedures are not visible. Where

the area adjacent to the Decontamination Unit is accessible to the public, construct a solid barrier on the public side of the sheeting to protect the sheeting along the perimeter of the Decontamination Unit. Construct barrier with wood or metal studs, max. 16 inches on center, covered with minimum 3/8-inch plywood.

B. Equipment Decontamination Unit:

1. Provide an Equipment Decontamination Unit consisting of a serial arrangement of rooms, Clean Room, Holding Area, and Washroom, each room separated by a minimum of three curtain doorways, for removal of equipment and material from Work Area. Do not allow personnel to enter or exit the Work Area through the Equipment Decontamination Unit.
2. Washroom: Provide Washroom for cleaning of bagged or drummed asbestos-containing waste materials. Water from the Washroom shall be filtered as previously described in the Section.
3. Holding Area: Provide Holding Area as a “drop location” for sealed drums and/or bagged waste materials passing from the Washroom.
4. Clean Room: Provide Clean Room to separate the Holding Area from the remainder of the building.
5. Equipment or Material: Obtain all equipment and/or material(s) from the Work Area through the Equipment Decontamination Unit using the following procedures:
 - a. When passing contaminated equipment, sealed plastic bags, drums or containers into the washroom, close all doorways of the Equipment Decontamination Unit, other than the doorway between the Work Area and Washroom.
 - b. Once inside the Washroom, wet-clean the bags and/or equipment before transporting the material to the Holding Area.
 - c. When cleaning is complete, insert bagged Waste material into a second clean bag/drum. Close all doorways except the doorway between the Washroom and Holding Area.
 - d. Workers outside the Equipment Decontamination Unit then should enter the Clean Room then the Holding Area to remove equipment and/or waste Containers for disposal. Workers should wear disposal clothing and respiratory protection as described in Section 02 82 13.11 entitled, ‘**Respiratory Protection**’ during these activities.

C. Clean Room Contamination:

1. If the air quality in the Decontamination Unit (clean Room) exceeds 0.01 fibers per cc analyzed by PCM or 70 structures per mm squared analyzed by TEM or its integrity is diminished through use as determined by the Abatement Designer or Air Monitoring Firm, no employee shall use the Decontamination Unit until corrective actions are taken and approved by the Abatement Designer or Air Monitoring Firm.

END OF SECTION

SECTION 02 82 13.80

ABATEMENT PROJECT DECONTAMINATION

1.01 GENERAL

- A. Carry out a first cleaning of all surfaces of the work area including polyethylene sheeting, tools, scaffolding and/or staging by use of damp-cleaning and mopping and/or a high efficiency particulate air (HEPA) filter vacuum until there is no visible debris from removed materials or residue on polyethylene sheeting or other surfaces. Do not perform dry-dusting or dry-sweeping.
- B. Equipment shall be thoroughly cleaned and contaminated materials removed from the work area before the Abatement Contractor shall be permitted to remove remaining polyethylene sheeting from walls and floors. The Abatement Contractor shall request a “preliminary” visual of the cleaning efforts from the Industrial Hygiene Firm before removal of remaining polyethylene sheeting will be permitted.
- C. The Abatement Contractor shall replace all pre-filters and clean the inside and outside of the negative air-pressurizing machines prior to requesting the “preliminary” visual.
- D. After polyethylene sheeting has been removed from walls and floors (critical barriers to remain), the Abatement Contractor will be responsible for cleaning all surfaces in the Work Area, including ducts, electrical conduits, steel beams, roof deck, etc., using “wet” methods and/or HEPA-filtered vacuum(s).
- E. After cleaning surfaces located under removed polyethylene sheeting throughout the Work Area, the Abatement Contractor shall allow adequate drying time (typically 4-hours or more). Then the “second” (or “fine” cleaning or “Final”) cleaning of all surfaces will be permitted. The Abatement Contractor shall leaf-blow surfaces throughout the Work Area using 1 hp leaf blower.
- F. At the completion of “second” cleaning, the Abatement Contractor's Supervisor shall perform a visual inspection of the Work Area to ensure that the Work Area is visibly clean of “gross” debris and contamination. Once acceptable, notify the Abatement Designer requesting a “final” visual be performed. A minimum of 24-hours notice is required.
- G. The Abatement Designer will then contact the Industrial Hygiene Firm for the “final” visual inspection.
- H. The “final” visual inspection includes the visual inspection and collection of the final air clearance samples. See Section 82 16.20 entitled, “Air Monitoring - Industrial Hygiene Services” and Section 82 16.90 entitled, “Work Area Clearance” for details on the requirement for the collection of the final air clearance samples. The Abatement Contractor shall provide leaf blower and extension cords to the air monitor for sampling.
- I. All visual inspections shall be performed only after surfaces inside the Work Area(s) are dry.

- J. The Industrial Hygiene Firm shall perform the final visual inspection and final air clearance sampling. Any discrepancies found shall be documented in the form of a punchlist.
- K. Final air clearance sampling shall not commence until the visual inspection is acceptable.
- L. If the Industrial Hygiene Firm finds that the Work Area has not been adequately decontaminated, then the Abatement Contractor will be required to repeat the cleaning procedures until the Work Area is acceptable. Any additional costs for performing additional “final” visual(s) or for obtaining additional sets of final air clearance samples will be the responsibility of the Abatement Contractor until the “final” visual and final air clearance samples are acceptable as required by these Specifications.
- M. Once the final air clearance samples are acceptable based on the clearance requirements, the Abatement Contractor will then be permitted to remove remaining critical barriers. Any generated waste shall be disposed of as asbestos-contaminated waste, as outlined in Section 02 82 33 entitled, “Disposal of Asbestos-Containing Waste Materials”.
- N. All negative air-pressurizing machines shall remain “active” until teardown is complete. Each machine again shall be cleaned and sealed with 6-mil polyethylene sheeting prior to being removal from the Work Area.
- O. After the Industrial Hygiene Firm has approved the final project decontamination and teardown is completed, notify the Abatement Designer requesting a “final” walkthrough.
- P. Any residual asbestos that may be present in which the Abatement Designer’s felt should have been cleaned during the precleaning phase shall be cleaned and cleared at the Abatement Contractor’s expense.

END OF SECTION

SECTION 02 82 16.10

ABATEMENT NEGATIVE AIR PRESSURIZING SYSTEM-

1.01 GENERAL

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to Work of this Section.
- B. Supply the required number of negative air machines to the site in accordance with these Specifications.
- C. Negative air-pressurizing machines used during the Project shall be equipped with “NEW” high efficiency particulate air (HEPA) filters prior to use. The Abatement Designer and/or his representative shall approve and confirm each negative air-pressurizing machine prior to use. Negative air-pressurizing machines and systems shall comply with ANSI Z9.2-79 and used according to manufacturer's recommendations.
- D. Provide a fully operational negative air system within the work maintaining continuously a pressure differential across the work area enclosures of -0.02” - -0.04” of water column. Monitoring shall be with a continuous strip recorder or using a Magnehelic gauge. Daily documentation by both the Abatement Contractor’s Competent Person and the Industrial Hygiene Firm representative will also be acceptable.
- E. Additional air filtration devices shall be provided inside the Work Area for emergency standby as well as for air circulation in “dead air” spaces.
- F. The negative air pressure differential shall be maintained at all times after approval of work preparations and until the confirmation of the final air clearance sampling.
- G. The Abatement Contractor shall check daily for leaks and log his checks in his Project logbook. This includes internal checks to negative air-pressurizing equipment and devices.

1.02 EXECUTION:

- A. Provide fully operational negative pressure systems supplying a minimum of one air change every 15 minutes. Determine the volume in cubic feet of the work area by multiplying floor area by ceiling height. Determine total ventilation requirement in cubic feet per minute (CFM) for the work area by dividing this volume by the air change rate.

$$\text{Ventilation Required (CFM)} = \text{Volume of Work Area (cu. ft.)} / 15 \text{ minutes}$$

- B. Determine the number of negative air machines needed to achieve a 15 minute change rate by dividing the ventilation requirements (CFM) above by capacity of exhaust capacity in cubic feet per minute with fully loaded filters (pressure differential which

causes loaded filters warning light to come on) in the machines labeled operating characteristics.

$$\text{Number of Negative Air Machines needed} = \frac{\text{Ventilation Requirement (CFM)}}{\text{Capacity of Each Machine loaded with filters (CFM)}}$$

(NOTE: Add two (2) additional negative air machine as a backup in case of equipment failure or machine shutdown for filter changing or for air scrubbing.)

- C. Locate exhaust negative air machine(s) so that the makeup air enters the work area primarily through the decontamination facilities and traverses work area as much as possible. This may be accomplished by positioning the exhaust negative air machine(s) at a maximum distance from the worker access opening or other makeup air sources. The locations of negative machines are marked on the drawing. Extra machines may be necessary as local exhaust and recirculation to remove asbestos fiber from air in rooms which are hard to reach during abatement.
- D. Each negative air machine shall be serviced by a dedicated minimum 115V, 20A circuit with overload device tied into an existing building electrical panel which has sufficient spare capacity to accommodate the load of all negative pressure negative air machines connected. Dedication of an existing circuit may be accomplished by shutting down existing loads on the circuit.
- E. Each negative air machine shall be provided with all new HEPA, secondary and primary filters before the start of the work. The filters shall be installed on site in each negative air machine. At the beginning of the project, when machines are brought to the site must be clean. These machines shall not be cleaned on site. Each filter shall be installed on site, in presence of the Air Monitor. The Air Monitor shall smoke test each machine for leakage of air around HEPA filter.
- F. Test each negative air machine used in the work area before any asbestos-containing material is wetted or removed. After the work area has been prepared, the decontamination facility set up, and the exhaust negative air machines installed, start the negative air machines (one at a time). Demonstrate operation and testing of negative pressure system to Air Monitor or CIH onsite.
- G. Start exhaust negative air machines before beginning work (before any asbestos-containing material is disturbed). After abatement work has begun, run the negative air machines continuously to maintain a constant negative pressure until decontamination of the work area is completed. Do not turn off negative air machines at the end of the work shift or when abatement operations temporarily stop.
- H. If an electrical power failure occurs, immediately stop all abatement work, wet down entire work area, and do not resume until power is fully restored and the exhaust negative air machines are operating again.

END OF SECTION

SECTION 02 82 16.20

ABATEMENT AIR MONITORING - INDUSTRIAL HYGIENE SERVICES

1.01 GENERAL

- A. The Owner shall be responsible for the coordination and contracting of an Industrial Hygiene Firm. The Owner will pay for the services provided by the Industrial Hygiene Firm. Air monitoring shall be under separate contract with the Owner.
- B. Air monitoring shall be done under the direct supervision of a North Carolina accredited Supervising Air Monitor (SAM), except for sampling required of the Abatement Contractor.
- C. The SAM shall be accredited as per the North Carolina Asbestos Hazard Management Board (AHMB) Program rules and maintain a current license and accreditation through the HHCUC.
- D. Air Monitor shall also be accredited as per the Asbestos Hazard Management Program rules and work under the direct supervision of a SAM and maintain a current license and accreditation through the HHCUC.
- E. The SAM shall have taken a 24-hour respiratory protection training course that is NIOSH, AIHA or HHCUC recognized.
- F. The Industrial Hygiene firm shall submit copies of their N.C. accreditations and documentation on respiratory protection training to the Abatement Designer prior to the award of the Contract.
- G. If specific project activities are assigned to an Industrial Hygiene Firm, the SAM is expected to be in direct control and responsible for industrial hygiene work completed on the Project. The SAM shall approve and sign all air monitoring results performed by the Industrial Hygiene Firm. The SAM signature must be an original. No rubber stamp signature shall be accepted.
- H. Employees of the HHCUC shall have right of entry into the Project. The HHCUC's SAM shall have final authority over the Industrial Hygiene Firm on the Project.

1.02 DESCRIPTION OF WORK

- A. The Industrial Hygiene Firm shall offer expertise to the Abatement Designer and Contractor, but is not directly responsible for the performance of the job.
- B. At the jobsite, the Industrial Hygiene Firm is expected to observe, be aware, and comment on general work site conditions and activities as they relate to the Specifications and profession of Industrial Hygiene, and make recommendations in writing to the Abatement Designer and Contractor.

- C. The Industrial Hygiene Firm is responsible for overseeing the protection of the environment from contamination, protection of persons in adjacent areas, and assurance that the areas are acceptable for occupancy.
- D. The Industrial Hygiene Firm has the authority to direct the Abatement Contractor relative to safety and environmental concerns. This includes stopping the work if necessary. All directions and comments made by the Industrial Hygiene Firm to the Abatement Contractor shall be written with a copy to the Abatement Designer.
- E. The Industrial Hygiene Firm shall furnish, if requested, the Abatement Contractor a copy of his field report within 24-hours of his visit. Copies of field notes and reports of observations shall be kept in the Industrial Hygiene Firm's Project logbook maintained on the jobsite.
- F. The SAM shall review and make comments to the Abatement Designer on the submittals listed in Section 02 82 10 entitled, "Project Coordination".
- G. The SAM shall approve any change in the Abatement Contractor's respiratory protection. This includes a review of the historical data.
- H. The Industrial Hygiene Firm is to conform to the Abatement Contractor's schedule and shall respond to necessary changes, provided an advance 48-hour notice is given as outlined in Section 02 82 10.
- I. The Industrial Hygiene Firm's Project Monitor shall provide the Abatement Designer and Abatement Contractor with a pager, or phone number, where he can be reached while not on site or after-hours.
- J. The Industrial Hygiene Firm shall notify the Abatement Designer and Contractor, in writing, of any failed clearance visits.
- K. At the completion of the Project, the Industrial Hygiene Firm shall prepare a report describing the assessment of the Project, all air monitoring data, acceptance letters, calibration records, and a description of the Project as it proceeded to completion and submit copies of the report to the Abatement Designer as required in the specifications.

1.03 AIR MONITORING

- A. Ambient Air Monitoring: The purpose of ambient air monitoring by the Industrial Hygiene Firm will be to detect discrepancies in the work area isolation, such as:
 - 1. Contamination of the building outside of the work area with airborne asbestos fibers.
 - 2. Failure of filtration or rupture in the negative air pressurizing system.
 - 3. To confirm that work practices established by the Abatement Contractor and respiratory protection provided for employees are adequate.

- B. Work Area Airborne Fiber Levels: The Industrial Hygiene Firm will monitor airborne fiber levels in the Work Area. The purpose of this air monitoring will be to detect airborne fiber levels, which may challenge the ability of the Work Area isolation procedures to protect the balance of the building or areas outside of the building from contamination by airborne fibers.
- C. Work Area Clearance: To determine if the elevated airborne fiber levels encountered during abatement activities have been reduced to an acceptable level, the Industrial Hygiene Firm will sample and analyze the concentration of airborne fibers as per Section 02 82 16.90, entitled "Work Area Clearance".
- D. In accordance with AHMB Program Rules, the SAM shall develop an Abatement Project Monitoring Plan, which complies with EPA and OSHA analytical criteria and will provide a valid representation of airborne fiber concentrations both inside and outside the work area. This program is not intended to satisfy the Abatement Contractor's requirement for sampling under the OSHA regulation. All personnel and area sampling conducted by the Industrial Hygiene Firm shall be personally observed. Air sampling pumps shall not be left unattended for extended periods of time.
1. The SAM shall submit a "written" air-monitoring plan to the Abatement Designer with a copy to the Abatement Contractor. The following information shall be required:
 - a. The name, address and telephone number of the Industrial Hygiene Firm.
 - b. The name, address, telephone number and NIOSH's PAT designation and proficiency data for the laboratory analyzing the air samples. Analysis of air samples collected shall be by a laboratory currently proficient in NIOSH's "Proficiency Analytical Testing Program for Laboratory Quality Control" for asbestos. The acceptable sampling and analysis method is NIOSH 7400, latest revision.
 - c. A proposed air sampling strategy shall include: a projected number of air samples, locations, the types of air samples to be collected (personal, area, ambient), how the air samples are to be collected (TWA, ceiling, other), the equipment to be used (pumps, calibration equipment, filters, other), and how the samples will be transported to the laboratory.
 1. All personal air samples will be collected in such a manner as to comply with OSHA collection and analytical regulations and to provide a valid representation of airborne fiber levels. The samples collected by the industrial hygiene firm on personnel do not satisfy the contractor's responsibility under OSHA.
 2. All final area air sampling will comply with all State and Federal requirements in measuring airborne asbestos following an abatement action.
 3. Air samples will be analyzed and results made available as per the AHMB Program Rules. Copies of all air sampling results shall be signed by the SAM and a copy posted at the job site. These copies shall include the following: sample number, sample location, activity represented by sample, flow rate, sample time, comments and sample results. A statement will be included on each submission that the requirements of this contract have been met as they apply to the activities of the SAM.

4. If TWA samples are being collected by the Abatement Contractor for the purpose of reducing respiratory protection requirements, the Industrial Hygiene Firm shall directly observe the conditions and work practices represented by each sample and make appropriate notes in the logbook onsite. The SAM shall review all TWA air sampling results, which are used for reducing respiratory protection requirements before accepting the results.
- E. Supplemental air monitoring may be conducted inside and outside the work area by the HHCU. This supplemental sampling does not fulfill air-monitoring responsibilities required by OSHA, EPA or this Contract.

1.04 SPECIFIC AIR MONITORING - INSPECTION REQUIREMENTS:

- A. All work and setup in each Work Area should be combined, if possible.
- B. The Industrial Hygiene Firm is required to inspect the Abatement Contractor's work area preparations and to ensure that the interior of each work area is properly isolated from the remainder of the building. The Industrial Hygiene Firm is required to perform air monitoring inside and outside the work areas where required as per the Air Monitoring Plan prepared by the SAM. The Industrial Hygiene Firm should check leaks from the work area whenever onsite and smoke test with the Abatement Contractor's representative. This must be documented in the Abatement Contractor's logbook, as well as air monitoring report.
- B. As per the abatement rules of the HHCU, the building under renovation will have either TEM or PCM clearance as per the public area rules. For demolition work, the final clearance will be using PCM method. The final clearance sampling shall be performed using AHERA TEM sampling and analysis protocol for each work area exceeding public area clearance method set by NC-HHCU.

END OF SECTION

SECTION 02 82 16.90

ABATEMENT WORK AREA CLEARANCE

1.01 GENERAL

- A. Notification and scheduling of the final visual inspection and collection of the final air clearance samples shall be the Abatement Contractor's responsibility.

1.02 FINAL CLEARANCE TESTING

- A. After the "second" cleaning is performed, the Abatement Contractor has allowed adequate drying time, and the Supervisor has inspected the Work Area then the Abatement Contractor will be permitted to request a final visual inspection be performed:
 - 1. The Industrial Hygiene Firm shall perform all final inspection during the Project. Each inspection shall be conducted following the guidelines as set forth in the American Society for Testing and Materials (ASTM), Standard Practices for Visual Inspection of Asbestos Abatement Projects, Designation: E1368.90. If the Work Area cleaning is acceptable, then the Abatement Contractor may request that the Industrial Hygiene Firm obtain final air clearance samples.
 - 2. Final air clearance samples shall be obtained using "aggressive" sampling protocol as described in the EPA's Asbestos Hazard Emergency Response Act (AHERA) regulations (40 CFR Part 763, Subpart E, Appendix A).
 - 3. If final air clearance samples are analyzed using Phase Contrast Microscopy analysis procedures (minimum of five samples using NIOSH 7400 method), then the maximum allowable flow rate shall be 12.0 liters per minute, with a minimum sample volume of 1500 liters per sample. Clearance criteria shall be less than 0.01 fibers per cubic centimeter (f/cc) for all samples analyzed.
 - 4. If final air clearance samples are analyzed using Transmission Electron Microscopy (TEM), the Mandatory Transmission Electron Microscopy Method described in 40 CFR Part 763, Subpart E, Appendix F shall be used. Clearance criteria shall be an arithmetic mean less than or equal to 70 structures per square millimeter (s/mm²) or a z-test less than or equal to 1.65.
 - 5. Final clearance criteria shall be in accordance with AHMB Program. Any abatement exceeding 160 square feet of surface area or 260 linear feet of pipe insulation will have TEM clearance as per the rules established by the HHCU. TEM FINAL AIR CLEARANCE IS REQUIRED FOR THE PROJECT FOR EACH WORK AREA (FLOOR).
 - 6. Upon receipt, the Industrial Hygiene Firm shall report to the Abatement Designer and Abatement Contractor the final air clearance sampling results.

7. If final clearance is not achieved through TEM clearance samples the contractor shall clean the Work Area and resampling will be performed until clearance is achieved. All cost for additional testing will be paid by the Abatement Contractor including the cost of analysis.

END OF SECTION

SECTION 02 82 33

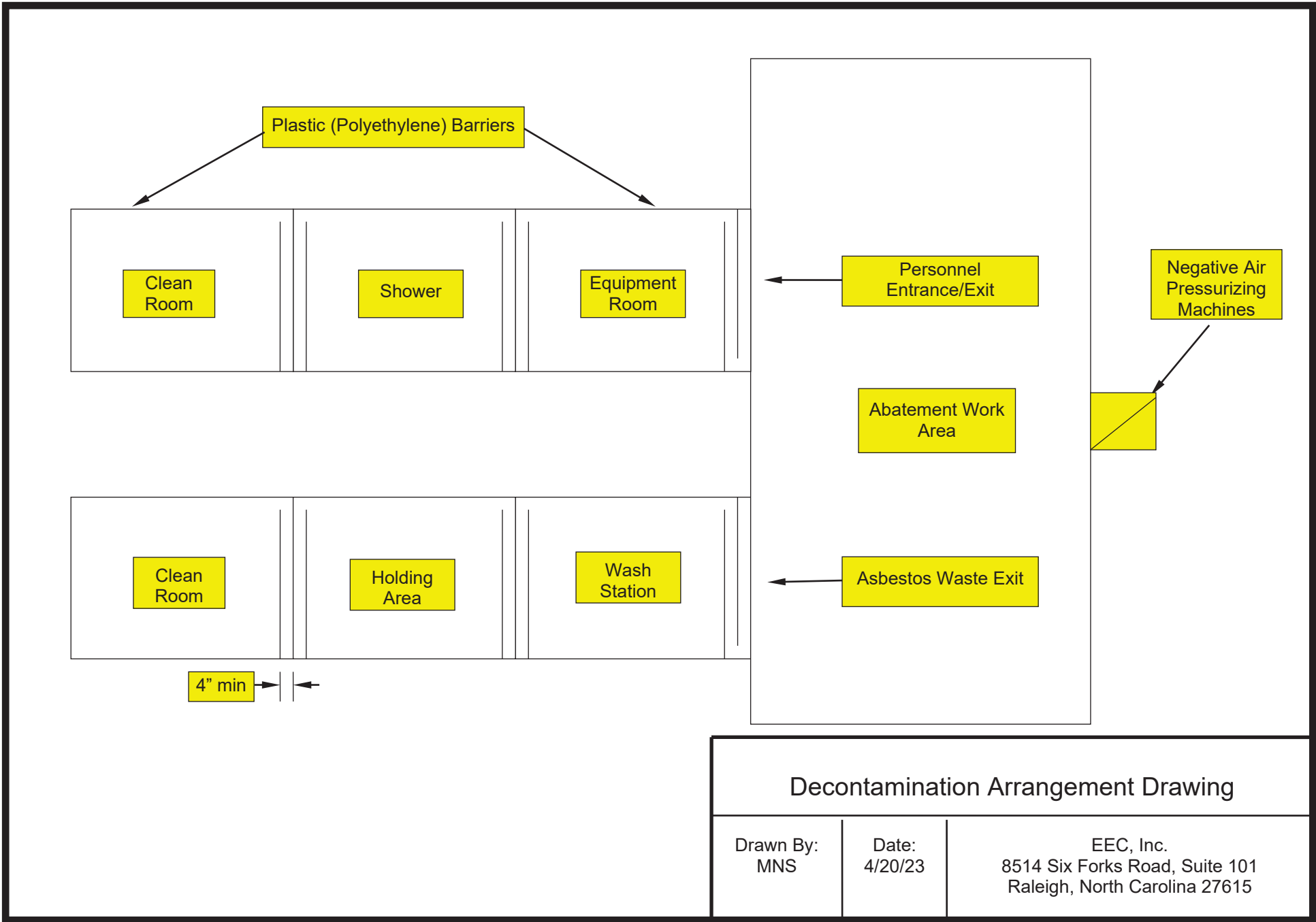
DISPOSAL OF ACM WASTE

1.01 GENERAL

- A. All asbestos-containing waste materials and miscellaneous debris shall be properly bagged, sealed and protected. The loadout vehicle/dumpster shall be locked at all times, while located on the site. Bagged waste shall then be transported to a predesignated disposal site, in accordance with 40 CFR 61.150 and DOT 49 CFR Parts 100-399.
- B. An enclosed container will be used to haul waste material to the disposal site. No rental vehicles or trailers shall be used. Vehicle selection, vehicle covers and work practices shall assure that no asbestos becomes airborne during the loading, transport and unloading activity, and that material is placed in the waste site without breaking any seals.
- C. Waste disposal polyethylene bags (6-mil) and containers, non-porous (steel/plastic) drums or equivalent, with labels, appropriate for storing asbestos waste during transportation to the disposal site shall be used. In addition to the OSHA labeling requirements, all containers shall be labeled with the name of the waste generator and the location at which the waste was generated.
- D. The contractor shall transport the containers and bags of waste material to the approved waste disposal site. The sealed plastic bags shall be placed into the burial site unless the bags have been broken or damaged. Upon the landfill's approval damaged bags shall be left in the non-porous containers and the entire contaminated package shall be buried. Uncontaminated containers may be reused.
- E. Workers loading and unloading the asbestos will wear respirators and disposable clothing when handling material. Asbestos warning signs shall be posted during loading and unloading of asbestos waste.
- F. The Abatement Contractor shall use the HHCU's Waste Shipment Record for disposal records as per 40 CFR 61.150 and distribute a copy of all waste shipment records to the Designer after the completion of the Project.
- G. All floor tile waste must be put in cardboard box and wrapped twice with polyethylene or put in burlap bag and then put in two individually wrapped 6-mil bags.
- H. All metallic waste can be wrapped with two layers of 6-mil polyethylene and properly labeled for proper disposal or all asbestos contamination shall be removed and wiped clean, inspected by the air monitor before disposal.

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Decontamination Arrangement Drawing

Drawn By: MNS	Date: 4/20/23	EEC, Inc. 8514 Six Forks Road, Suite 101 Raleigh, North Carolina 27615
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APPENDIX B
NORTH CAROLINA STATE UNIVERSITY HAZARDOUS WASTE PROGRAM
MANAGEMENT OF BUILDING DEMOLITION DEBRIS

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NORTH CAROLINA STATE UNIVERSITY HAZARDOUS WASTE PROGRAM MANAGEMENT OF BUILDING DEMOLITION DEBRIS

The attached provides an outline on the identification of hazardous/universal waste, which may be generated during the demolition of university buildings.

A fundamental premise that dictates involvement of the University Hazardous Waste Program Manager (HWPM) is that the University cannot “contract away” its responsibilities for management of hazardous/universal waste. Therefore, the University HWPM needs to be involved with waste identification and the decision-making process.

For hazardous/universal wastes the HWPM needs to approve of all aspects of managing that waste, including container selection, labeling, and management and accumulation area management.

The HWPM must sign all documents necessary for removal of hazardous/universal waste.

Manifests and certificates of disposal/destruction, treatment or recycling are returned to the HWPM.

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APPENDIX C
NORTH CAROLINA STATE UNIVERSITY HAZARDOUS WASTE PROGRAM
BUILDING RENOVATION WASTE MANAGEMENT

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BUILDING RENOVATION WASTE MANAGEMENT

The demolition process generates a wide variety of solid waste. This is to provide the procedure for how this waste is managed.

The inspection and evaluation of building components for the purpose of worker protection is described in the referenced Construction Guidelines.

Building Survey Information

The hazardous waste program uses the lead paint survey data to determine the appropriate waste management approach for general building demolition debris.

Responsibilities

The NCSU Construction Project Manager has ultimate responsibility for the implementation of the project.

The NCSU Hazardous Waste Program Manager has responsibility for decisions and actions controlling the determination and management of hazardous and universal waste.

Other Procedures

Construction Guidelines, 01302 Contractor Safety Notifications
Construction Guidelines, 01900 Decommissioning - Decontamination

Contents

Asbestos

Lead

Fluorescent Lights

Fluorescent Light Ballasts

Electrical Equipment

Thermostats

Batteries

Ducts

Metal Piping

Galvanized
Copper

Hazardous Material Storage Cabinets

Gas Cabinets
Flammables Storage Cabinets

Refrigeration Equipment

Sink Trap Sludge

Smoke Detectors

Emergency Exit Signs

Other

Scrap Metal
Residual Wastes

Waste-Specific Procedures

Asbestos

The survey contractor will refer to the University-provided asbestos inventory, and supplement as necessary, as a basis for surveying the renovated area for the presence of asbestos-containing materials. Any asbestos-containing building debris can be managed, implementing the necessary procedures, as construction and demolition debris. See Construction Guidelines 01302 and 01900.

The survey contractor should recognize the limitations of the University-provided asbestos survey data.

Lead

The identification of lead integrated into the building components is discussed in Construction Guideline 01302.

Lead which is a constituent of the metal waste debris being recycled does not present a problem for that action.

All building demolition debris which is not suitable for recycling/reclamation, should be placed in waste containers (e. g., rolloffs). The NCSU Hazardous Waste Program Manager will make a determination as to the waste management approach for this

waste using the lead survey data prior to removal from the work site. Demolition waste must be tested by the demolition contractor for lead content using TCLP testing. A determination must be made for proper disposal if found to contain lead and NCSU hazardous waste program must be notified.

Paint chips will be collected in the correct DOT-compliant shipping container and removed from the project site by the University Hazardous Waste Program.

Fluorescent Tubes

Fluorescent tubes will be placed in tube boxes, and the ends of the boxes will be sealed. Broken tubes will be collected in appropriate wax-lined fiber drums or boxes and labeled as Universal Waste. Fluorescent tubes will be removed from the project site by the University Hazardous Waste Program.

Light Ballasts

Fluorescent light ballasts that do not display a "No PCBs" label, or have a manufacture date before 1980, will be assumed to contain PCBs at a level which causes them to be managed as a PCB-containing article. These PCB-containing articles will be placed in proper DOT containers. Light ballasts containing PCB's will be removed from the project site by the University Hazardous Waste Program.

Those ballasts which are labeled as "No PCBs" or have a manufacture date after 1980, will be sent to a metal recovery facility.

Electrical Equipment

Electrical equipment removed from the building may include fluid-containing equipment, such as capacitors and transformers. All fluid-containing electrical equipment will be inventoried and segregated for evaluation prior to disposal. The evaluation will be coordinated with the NCSU Hazardous Waste Program Manger and appropriate power distribution or electrical personnel in Facilities Operations.

Other electrical equipment, such as motors and switches will be segregated for disposal or recycling, as the item dictates. Disposal or recovery of this equipment will be coordinated with the University Hazardous Waste Program.

Thermostats

Thermostats removed from the buildings subject to renovation contain mercury switches. Therefore, these items must be managed as hazardous waste. Removed thermostats will be placed in the appropriate DOT shipping container. Shipping and disposal will be managed by the NCSU Hazardous Waste Program Manager.

Batteries

Batteries removed from the building during renovation are to be segregated for evaluation and management as either hazardous or universal waste.

Ducts

Metal air handling ducts removed from the building, associated with either laboratory fume hoods or building HVAC systems, are to be collected for recycling as scrap metal. When visible contamination is observed, the ductwork should be brought to the attention of the NCSU Hazardous Waste Program Manager.

Metal Piping

Metal piping, including lead, copper and iron, removed from the building will be collected for recycling as scrap metal.

Hazardous Material Storage Cabinets and Gas Cabinets

Hazardous material storage cabinets should be checked for residues from spills , etc. If these residues exist, they should be removed, with the removed residue and removal materials being managed as potentially hazardous waste. This determination will be made by the NCSU Hazardous Waste Program Manager.

The cleaned cabinets should be sent out for metals recovery (scrap metal), salvage after confirmation that the cabinets are not suitable for campus reuse.

Refrigeration Equipment

Refrigeration equipment to be removed for the renovation will be evaluated to ensure that each device has been drained of refrigerants. If a piece of equipment is found to contain refrigerants, then the NCSU Construction Project Manager will coordinate the removal of the refrigerants with Facilities Operations.

Refrigeration equipment (sans refrigerants) removed from the building will be managed as scrap metal for recycling.

Sink Trap Sludge

The following procedure describes the collection of sludge from lab sink traps (and other system traps, as necessary) for isolation of mercury.

Laboratory tap water will be run through all wastewater lines and traps prior to removal of traps, breakage of lines or the commencement of demolition activities in the area where these pipes could be disturbed. Prior to disconnection of wastewater system traps, secondary containment, such as a bucket, shall be placed beneath the trap to be

removed. The contractor will disassemble the lab wastewater system beginning with the traps at the lab sinks and potentially elsewhere. Trap contents (sludge) will be removed for visual evaluation. Sludge containing mercury will be segregated from the non-mercury contaminated sludge. Both types of sludge will be collected in DOT-approved containers (preferably 5-gallon buckets).

Buckets containing both types of waste (containing and not containing mercury) will be removed from the job site by the University Hazardous Waste Program Manager.

Smoke Detectors

Smoke detectors may contain a radioactive source and must be collected for proper disposal and will be placed in DOT-approved containers. Smoke detectors will be removed from the job site by the University Hazardous Waste Program Manager.

Emergency Exit Signs

Emergency exit signs which have no electrical connection contain a radioactive source and must be placed in DOT-approved containers. These emergency exit signs will be removed from the job site by the University Hazardous Waste Program Manager.

Others

Scrap metal may be present in forms other than those described above. All metals should be set aside for recycling, including aluminum, copper, brass, lead, galvanized, iron, and steel (stainless and other).

Residual wastes are materials or contaminants found during the course of demolition and area evaluation. This may include articles or chemicals in areas that were previously inaccessible (e.g., under cabinets), and contaminants washed or wiped from fume hoods. These residual wastes are to be collected, evaluated, and disposed of in coordination with the NCSU Hazardous Waste Program Manager.

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APPENDIX D
NORTH CAROLINA STATE UNIVERSITY HAZARDOUS WASTE PROGRAM
WASTE MANAGEMENT PLAN

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WASTE MANAGEMENT PLAN

Waste management plans will vary depending on the scale and scope of the project. In the most general terms, the plan should identify the general types of wastes that may be encountered for each phase of the project, the collection and accumulation strategy, marking and identification requirements, and procedures for appropriate removal of wastes from the site. Examples are as follows:

Removal of fluorescent light fixtures: Fluorescent tubes will be removed and placed in boxes or drums, which are then sealed and placed in a secured location onsite until the NCSU Construction Project Manager can coordinate the removal. Light ballasts will be removed and identified as either PCB or non-PCB ballasts. PCB ballasts and those which could not be identified as non-PCB will be placed in a drum marked for PCB ballasts. Drums will be marked ("**PCB Ballasts**" or "**Non-PCB Ballasts**" and with the date materials are first added and placed in a secured location onsite until the NCSU Construction Project Manager can coordinate the removal. Environmental Health & Safety will be notified that containers are ready for collection.

Evaluation of sink traps: Sink traps will be removed and their contents poured into a bucket. Evaluation will consist of a visual inspection for the presence of metallic mercury. Waste containing visible mercury will be poured into a container marked for "mercury-containing waste". Waste that does not contain visible mercury will be poured into a container marked for "non-mercury". Containers will be marked with the date materials are first added, and placed in a secured location onsite until the NCSU Construction Project Manager can coordinate the removal. Environmental Health & Safety will be notified that containers are ready for collection.

Removal of metal components (fume hoods, HVAC or exhaust ducts, door frames, etc.): Following evaluation as described in the contract, metal components will be placed in a secured roll-off location onsite until the NCSU Construction Project Manager can coordinate the removal. The roll-off will then be delivered to a NCSU designated location for recycling.

Decontamination of structures and equipment: [General description of materials used for decontaminated purposes, containers to be used, markings/identification, designation of accumulation areas, and coordination of waste disposal.]

Waste management issues were outlined in the request for bids and forms the basis for waste management plans that are required for the project. The contractor is most knowledgeable regarding the sequence of events, the scale and scope of the project, and materials likely to be necessary for project completion. In some instances, a general site safety and health plan may be appropriate, identifying hazard zones, safe work practices, location of safety equipment, access controls, etc.

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SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section covers cast-in-place structural concrete and accessories including vapor barriers, reinforcement, finishing, curing, grout, joints, and joint sealants in concrete slabs.

1.02 TOLERANCES

- A. Float and Broom Finish: Plane within 5/16" in 10 feet as determined by a 10 foot straightedge.
- B. Steel Trowel Finish:
 - 1. Slab-on-Grade Repairs.
- C. Formed Surfaces: ACI 301.
- D. Reinforcement (Fabricating and Placing): ACI 301.
- E. Other Tolerance Requirements: Conform to ACI 117.

1.03 SUBMITTALS

- A. In accordance with Division 1 furnish the following:
 - 1. Concrete Mix Design for each mix with evidence of strength per Section 2.3.
 - 2. Manufacturers' literature containing product information for admixtures, joint sealing materials, waterstops, expansion joint filler, and sealers.

1.04 APPLICABLE PUBLICATIONS

- A. The publications (latest edition) listed below form a part of this Specification to the extent referenced. The publications are referenced in the text by the basic designation only.
 - 1. American Society For Testing and Materials (ASTM).
 - a. A185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - b. A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - c. C31 - Making and Curing Concrete Test Specimens in the Field.
 - d. C33 - Concrete Aggregates.
 - e. C39- Compressive Strength of Cylindrical Concrete Specimens.
 - f. C94 - Ready-Mixed Concrete.
 - g. C143 - Slump of Portland Cement Concrete.

- h. C150 - Portland Cement.
 - i. C171 - Sheet Material for Curing Concrete.
 - j. C172 - Sampling Freshly Mixed Concrete.
 - k. C231 - Air Content of Freshly Mixed Concrete by the Pressure Method.
 - l. C260 - Air-Entraining Admixtures for Concrete.
 - m. C494 - Chemical Admixtures for Concrete.
 - n. C618 - Fly Ash and Raw or Calcined Natural Pozzolan for use as a mineral admixture in Portland Cement Concrete.
 - o. D1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
2. American Concrete Institute (ACI).
- a. 301 - Specification for Structural Concrete for Buildings.
 - b. 302.1R - Guide for Concrete Floor and Slab Construction.
 - c. 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - d. 305 - Hot Weather Concreting.
 - e. 306 - Cold Weather Concreting.
 - f. 315 - Details and Detailing of Concrete Reinforcement.
 - g. 318 - Building Code Requirements for Reinforced Concrete.
 - h. 347 - Recommended Practice for Concrete Formwork.

PART 2 - PRODUCTS

2.01 MATERIALS FOR CONCRETE

- A. The following materials shall conform to the respective Specifications and other requirements specified herein.
- 1. Portland Cement: ASTM C150, Type I or II.
 - 2. Coarse Aggregate: ASTM C33.
 - a. The nominal maximum size of coarse aggregate shall not be larger than:
 - 1) 1/5 the narrowest dimension between sides of forms.
 - 2) 1/3 the depth of slabs.
 - 3) 3/4 the minimum clear spacing between individual reinforcing bars or wires or bundles of bars.
 - 4) 3/8" for concrete used for filling masonry voids greater than 2".
 - b. No coarse aggregate shall be used in concrete for filling masonry voids less than 2".
 - c. Unless other conditions control (see above), maximum aggregate size shall be at least 3/4 inches.
 - 3. Fine Aggregate: ASTM C33. Do not use manufactured sands.
 - 4. Mixing Water: Fresh, clean and potable.
 - 5. Air-Entraining Admixture: ASTM C260.
 - 6. Chemical Admixture: ASTM C494.
 - 7. Pozzolan: ASTM C618, Class C or F.

2.02 CONCRETE MIXES

- A. Compressive strength and maximum slump (tests in accordance with ASTM C39 and C143, respectively) shall be 3,000 PSI.
 - 1. The strength of the concrete mixes proposed for use shall be established prior to beginning concrete operations. The concrete mix may be proportioned on the basis of field experience, trial mixes, or water cement ratio as stated in ACI 318. Evidence of concrete strength is to be submitted to the Engineer with the concrete mix design.
- B. A third generation high range water-reducing (HRWR) admixture conforming to ASTM C-494 shall be required for all pumped concrete and optional in all other concrete mixes. Slump shall be measured before the addition of an HRWR when the HRWR is added at the site.
- C. Air-entrainment is required for all exterior concrete. Do not entrain air in concrete used for interior slabs. Air content shall conform to the following table:

<u>Nominal Maximum Size of Coarse Aggregate, Inches</u>	<u>Total Air Content Percent by Volume</u>
3/8	4.5 to 7.5
1/2	4 to 7
3/4	3.5 to 6.5
1	3 to 6
1-1/2	3 to 6

- D. Fly ash is required for all mix designs at a quantity between 20% and 25% of total cementitious material.
- E. Materials shall be stored, batched, and mixed as specified in ASTM C94.

2.03 VAPOR BARRIER

- A. Provide a vapor barrier below slabs-on-grade.

2.04 REINFORCING STEEL

- A. ASTM A615, deformed Grade 60.

2.05 WELDED WIRE FABRIC

- A. ASTM A185, supplied in sheets.

2.06 DEFORMED WELDED WIRE FABRIC

- A. ASTM A496 and A497, Grade 80.

2.07 PREFORMED (EXPANSION) JOINT FILLER

- A. ASTM D1751 or D1752, 1/2" thick unless noted.

2.08 BUILDING FELT

- A. 30 lb. asphalt saturated building-felt paper.

2.09 SHEET MATERIALS FOR CURING CONCRETE

- A. ASTM C171.

2.10 LIQUID CURING/SEALING COMPOUNDS

- A. For curing of slabs and foundations select one (1) of the following products with a high solids content and meeting ASTM C-309 (see below for where not allowed):
 1. "Masterkure" by Master Builders.
 2. "Super Rez-Seal" by Euclid Chemical Co..
 3. "Kure-N-Seal 30" by Sonneborn Building Products.
- B. For curing of formed surfaces select an oxidizing compound equal to Kurez DR VOX by Euclid Chemical Co.
- C. Curing compounds shall not be used in areas to receive adhesives for floor coverings or paint without written certification of compatibility from the floor covering or paint manufacturer.

2.11 LIQUID SEALER

- A. Select one of the materials specified for slabs in previous paragraph, Liquid Curing/Sealing Compounds.

2.12 GROUT, NONSHRINKING

- A. Premixed nonmetallic, mixed and applied in accordance with manufacturer's recommendations. Grout shall show no settlement or vertical drying shrinkage based on initial measurement made at time of placement, and produce a compressive strength of at least 3,000 psi at three (3) days.

2.13 POLYURATHANE JOINT SEALERS

- A. Product equal to Sonolastic SL 2 by Sonneborn.

PART 3 - EXECUTION

3.01 REINFORCEMENT

- A. Details of concrete reinforcement, unless otherwise shown, shall be in accordance with ACI 318, ACI 315, and ACI 301. All reinforcing steel shall be supported and securely tied to prevent displacement during the placing of concrete.

3.02 EMBEDDED ITEMS

- A. Embedded items shall be positioned accurately and supported against displacement.

3.03 PLACING, PROTECTION, AND CURING CONCRETE

- A. In normal weather conform to ACI 304.
- B. In cold weather conform to ACI 306R, except that the use of calcium chloride shall not be permitted.
- C. In hot weather conform to ACI 305R.
- D. Conform to ACI 302.1R, ACI 308 and as specified herein.
- E. Approved curing methods are as follows:
 - 1. Water curing by covering the entire surface of concrete with water. The curing water should not be more than twenty (20) degrees F cooler than the concrete.
 - 2. Water curing by fog spraying or sprinkling to provide a continuous film of water over the entire surface of concrete.
 - 3. Water curing by means of covering the entire surface with absorbent materials which shall be kept moist. Absorbent materials can be burlap, cotton mats, rugs, or other approved materials.
 - 4. Curing by means of covering the entire surface with waterproof sheet materials to reduce the loss of mixing water from the concrete.
 - a. Materials can be polyethylene sheeting, waterproof paper, or polyethylene coated burlap. Lap sides and ends at least 3 inches and seal with waterproof tape.
 - b. On slabs the sheets should extend over the edges at least twice the slab thickness and held down with sand bags or weights.
 - c. During cold weather black polyethylene sheeting should be used.
 - d. During hot weather white polyethylene sheeting should be used.
 - 5. Curing by means of spraying or rolling a liquid membrane forming curing compound according to manufacturer's recommendations over the entire surface.
 - a. A white-pigmented Class 2 compound shall be used when the concrete is exposed to the sun; otherwise use Class 1.
 - b. Curing compounds shall not be used in areas to receive adhesives for floor coverings or paint without written certification of compatibility from the floor covering or paint manufacturer.

- c. A membrane-forming curing compound shall not be used on slabs which are to receive a liquid densifier.
- 6. Formed surfaces shall be cured by moist curing with forms in place for the full curing period. If forms are removed early, then apply an oxidizing curing compound specified in Part 2.
- F. Minimum period of curing for all methods is seven (7) days unless a shorter period is approved by the Engineer.

3.04 FINISHES

A. Slab Finishes:

1. Scratch Finish: Slab surfaces to receive a bonded applied cementitious application shall all be thoroughly raked or wire broomed after partial setting (within two hours after placing) to roughen surface to insure a permanent bond between base slab and applied cementitious materials.
2. Float Finish: Unless noted otherwise, surfaces to receive a float finish shall include interior stair treads, equipment pads and surfaces intended to receive roofing or waterproofing membranes. After the concrete has been placed, struck off, and leveled, the concrete shall not be worked further until ready for floating. Floating shall begin when the water sheen has disappeared. During the first floating the slabs shall be checked for planeness of surface. The slab shall then be refloated immediately to a uniform sandy texture.
3. Trowelled Finish: Unless noted otherwise, surfaces to receive a trowelled finish include exposed concrete floors and floors to receive resilient floor covering or carpet. The surface shall first be float-finished as specified above. It shall then be power trowelled, and finally hand trowelled such that the finished surface is essentially free of trowel marks and uniform in texture and appearance.
4. Broom Finish: Unless noted otherwise, surfaces to receive a broom finish include exterior platforms, steps, and landings; and exterior and interior pedestrian ramps. Immediately after the concrete has received a float finish, it shall be given a coarse texture by drawing a broom across the surface and perpendicular to the direction of traffic.

B. Floor Slab Tolerances:

1. See Paragraph 1.02 of this Section for tolerances.
2. Correct defects by grinding or removal and replacement of the defective work. Areas requiring corrective work will be identified. Remeasure corrected areas by the same process.

3.05 LIQUID SEALER APPLICATION

- A. See the Architectural Finish Schedule for all exposed concrete slabs to be sealed. Apply a minimum of two coats of the specified liquid curing/sealing compound per manufacturer's recommendations.

1. First Coat: Apply immediately after slab placement for curing and sealing.
2. Second Coat: Apply after the construction is substantially complete. Thoroughly clean the slab before applying the second coat.

3.06 JOINTS

- A. Control joints in new floor slabs shall be saw cut to a depth equal to 1/4 the slab thickness unless shown otherwise on the Drawings. See Drawings for joint details. The slab shall be sawed as soon as the edges of the cut will not ravel.
- B. Construction joints shall be located by the Contractor in conformity with the predetermined joint layout. If concreting is interrupted long enough for the placed concrete to harden, a construction joint shall be used. The details of the joint shall be as shown on the Drawings.
- C. Joints in slab areas to receive a special covering such as tile, carpeting, or resinous flooring are not to be sealed. Slab joints in these areas shall be treated by the floor covering installer.
- D. Where required, joint sealant or filler shall be installed per manufacturer's recommendations. Slab is to be in place for sixty (60) days minimum before installing sealant or filler to allow for concrete shrinkage.

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SECTION 04 20 00

UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 2. Concrete masonry units.
 - 3. Mortar.
 - 4. Reinforcement, anchorage, and accessories.

1.02 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. Source Control: Obtain each type of exposed masonry unit from a single manufacturer. Texture and color of each type shall be uniform or of a uniform blend acceptable to the Architect.
 - 1. Manufacturer of each type of masonry unit shall have not less than ten years experience manufacturing the specified products.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means which will prevent mechanical damage and deterioration due to moisture, temperature changes, and contamination by other materials.
 - 1. Provide protection which will limit moisture absorption of masonry units to the maximum percentage specified for Type I units at a relative humidity which is normal for the project site.
- B. Protect cementitious materials from precipitation and absorption of ground moisture.
- C. Store masonry accessories to prevent corrosion, dirt accumulation, and other deterioration.

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards for types required, and as follows:

1. Size: Provide units to match the size and texture of the existing units. Owner's record drawings of existing building indicate a unit thickness of 6 inches. Verify actual thickness in field.
2. Bond Pattern: match existing adjoining masonry pattern.
3. Hollow non-load-bearing units: ASTM C 129, Type 1, and as follows:
 - a. Net area compressive strength of concrete masonry units shall be at least 1900 psi.
 - b. Lightweight, ASTM C 331 and ASTM C 33, with a dry net weight of not more than 100 lbs. per cubic foot.
 - c. Exposed faces: Manufacturer's standard color and texture.
 - d. Provide fire-rated units where indicated on drawings.

2.02 MORTAR AND GROUT MATERIALS

- A. Mortar: Per ASTM C270.
- B. Mixed by Proportions Specifications method.
- C. Mortar Materials:
 1. Portland Cement: ASTM C 150, Type I.
 - a. Type III may be substituted during cold-weather construction.
 - b. Provide Portland cement .
 2. Hydrated Lime: ASTM C 207, Type S.
 3. Aggregate for Interior Mortar: ASTM C 144.
 4. Aggregate for Exterior Mortar: ASTM C 144.
 5. Water: Potable.
- D. Use the following mortar types for the conditions defined:
 1. Type N
 - a. Interior walls, non-load bearing.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Joint Reinforcement and Anchorage Materials: Comply with the following general requirements for materials required in joint reinforcement and anchorage devices:
 1. Steel wire: ASTM A 82.
 - a. Hot-dip galvanizing (after fabrication): ASTM A 153, Class B-2.
 - 1) Use: Exterior locations or when in contact with earth.
 - 2) Use: Interior locations when in wet locations.
 2. Steel Sheet: ASTM A 635 or ASTM A 366.
 - a. Hot-dip galvanized (after fabrication): galvanizing in compliance with ASTM A 153, Class B.
 - b. Use: Anchors and miscellaneous sheet metal in masonry accessories at exterior exposures.

- B. Horizontal Joint Reinforcement: Welded-wire units prefabricated into straight lengths of not less than 10 feet, with deformed continuous side rods and plain cross rods.
1. Width: Approximately two inches less than nominal wall width, providing not less than 5/8 inch mortar coverage on exterior exposures and 1/2 inch elsewhere.
 2. Wire sizes:
 - a. Side rod diameter: 9 gauge; 0.1483 inch diameter.
 - b. Cross rod diameter: 9 gauge; 0.1483 inch diameter.
 3. Configuration:
 - a. Applications of single CMU unit width: Ladder design, with cross rods at not more than 16 inches on center.
 4. Meet ASCE/ACI 530 building code requirements for masonry structures and ASTM A 951 standard specification for masonry joint reinforcing.
 5. Hot-dip galvanizing (after fabrication): ASTM A 153, Class B-2.
 6. Products of the following manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - a. Wire-Bond - Masonry Corporation of America Series, 200 Ladder Mesh.
 - b. Hohmann & Barnard, Inc., 220 Ladder Mesh Reinforcement.
 - c. Similar products by other manufacturers with the same physical characteristics.

2.04 MORTAR MIXING

- A. General: Do not use admixtures unless indicated as acceptable in the contract documents.
1. Do not use calcium chloride in mortar or grout mixture.
- A. Mixing: Use mechanical batch mixer and comply with referenced ASTM standards.

PART 3 - EXECUTION

3.01 INSTALLATION PROCEDURES

- A. Concrete Masonry Units: Do not wet concrete masonry units prior to laying.
- B. Reinforcement and Anchorage: Before placing metal masonry accessories, remove loose rust, dirt, and other coatings.
- C. Masonry Thickness: Build masonry elements to full thickness shown.
1. Build single-wythe walls to actual thickness of masonry units.
- D. Chases and Recesses: Build masonry to accommodate the work of other trades, including chases and recesses as shown or required. Provide not less than 8 inches of masonry between jambs of openings and chases and recesses.

- E. Openings for Equipment and Services: Leave openings in masonry as required for subsequent installation of equipment and services. Make openings in locations and in exact sizes required, if known; otherwise, leave rough openings in approximate size required and complete masonry work after installation of equipment and services, matching adjoining masonry.
- F. Cutting: Where cutting is required, use power saws to provide clean, sharp, unchipped edges.

3.02 MASONRY CONSTRUCTION - GENERAL

- A. Built-in Work: As work progresses, build in items indicated for installation in masonry, filling around built-in items solidly with masonry.
 - 1. Fill joints between masonry and metal frames solidly with mortar, unless specific conditions are otherwise detailed.
- B. Nonbearing Partitions: Extend full height to solid structure above, unless otherwise detailed.
 - 1. Fill joint at top of nonbearing partitions with mortar when structure above has reached final deflection.
- C. Lintels: Install lintels of types indicated at all openings.
 - 1. Bearing: Provide not less than 8 inches of bearing at each jamb.

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. Joints: Make mortar joints visually and dimensionally consistent with adjoining masonry construction.
- C. Concealed Joints: Cut flush, unless otherwise detailed.
- D. Exposed Joints: Using concave jointer slightly larger than joint width, tool exposed joints before mortar has assumed final set.
- E. Resetting: Do not pound, tap, or otherwise attempt to adjust masonry units after initial set has occurred. Remove units which require adjusting, clean thoroughly, and reset in fresh mortar.
- F. Fill collar joints between wythes solidly with mortar as each course is laid for all multiwythe applications except designated cavity walls.
- G. Fire rated Construction:
 - 1. Where fire rated partitions run to deck, fill voids at deck with minimum 4 pcf density mineral wool batt insulation compressed a minimum of 50%.

2. Completely cover the mineral wool with spray or brush applied fire barrier compound to a minimum of 1/16 inch wet (1/8 inch wet) film thickness on each side of wall, overlapping wall and deck a minimum of 1 inch.

3.04 CAVITY WALL CONSTRUCTION

- A. Horizontal Joint Reinforcement: Install continuously in bed joints at 16 inches on center vertically to bond wythes of cavity walls, lapping individual sections at least 6 inches. Do not span movement joints with reinforcement.

3.05 JOINT REINFORCEMENT, SINGLE-WYTHE WALLS

- A. General: Provide continuous horizontal joint reinforcement for all single-wythe masonry walls, unless otherwise indicated. Lap reinforcing a minimum of 6 inches.
- B. Vertical Spacing: Not more than 16 inches on center.
- C. Continuity: Use prefabricated L-shaped and T-shaped sections at corners and intersections. Do not span movement joints with reinforcement.

3.06 ANCHORING MASONRY

- A. Anchorage: Anchor new masonry to existing masonry at points of adjacency, and as follows:
 1. Fasten anchors and embed in mortar joints as masonry is laid.
 2. Space anchors at maximum of 32 inches on center horizontally and 16 inches on center vertically.

3.08 REPAIRING MASONRY

- A. Replacement: Carefully remove areas of damaged masonry and replace with matching, undamaged units using mortar which matches original work.
- B. Pointing: As joints are being tooled, remove mortar with visible holes or mortar which cannot be compacted properly because of hidden voids, and replace with fresh mortar, filling each joint completely and tooling to match adjacent work.

3.13 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.

END OF SECTION

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SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Miscellaneous Metals
 - 2. Lintels

1.02 PERFORMANCE REQUIREMENTS

- A. Structural Performance Requirements: Where complete sizes or dimensions of structural members, connections, or fasteners of any item are not indicated, design the item to produce strength appropriate to the use intended.

1.03 SUBMITTALS

- A. Shop Drawings for fabricated items.
- B. Product Data for manufactured components.

1.04 QUALITY ASSURANCE

- A. Where fabrications are specified to comply with specific structural performance requirements, provide design sealed by a professional engineer registered in the state in which the project is located

PART 2 - PRODUCTS

2.01 MATERIALS - METALS

- A. Steel Shapes:
 - 1. Plates, bars, angles, channels, and H-sections: ASTM A 36.
 - 2. Galvanizing: Where indicated provide hot-dip galvanizing after fabrication in accordance with ASTM A 123.
 - 3. Tube:
 - a. Hot-rolled: ASTM A 501.
 - b. Cold-formed: ASTM A 500.
 - 1) Galvanizing: Hot-dip galvanizing after fabrication in accordance with ASTM A 123.
 - 4. Pipe: ASTM A 53 (black steel and hot-dip galvanized).
 - a. Galvanizing: ASTM A 53, (G185 nominal).

- B. Gray Iron Castings: ASTM A 48.
- C. Malleable Iron Castings: ASTM A 47.
- D. Aluminum Sheet: ASTM B 209; alloy and temper suitable for application and finish.
 - 1. Finishes: As indicated on drawings.
- E. Aluminum Shapes: Alloy and temper suitable for application, strength required, and finish.
 - 1. Plate: ASTM B 209.
- F. Stainless Steel: Type 302/304, satin finish (No. 4).

2.02 MATERIALS - MISCELLANEOUS

- A. Grout: Nonshrink, factory blended and packaged; complying with ASTM C 1107.
- B. Fasteners: Use fasteners suitable for the material being fastened and for the type of connection required.
 - 1. For exterior use or built into exterior walls: Nonferrous stainless steel, zinc coated or cadmium plated.
 - 2. Use fasteners of same material as items being fastened unless otherwise indicated.
 - 3. Bolts and studs: ASTM A 307.
 - 4. Nuts: ASTM A 563.
 - 5. Lag bolts: FS FF-B-561.
 - 6. Machine screws: FS FF-S-92.
 - 7. Wood screws: FS FF-S-111.
 - 8. Plain washers: FS FF-W-92.
 - 9. Lock washers: FS FF-W-84.
 - 10. Expansion shields: FS FF-S-325.
 - 11. Toggle bolts: FS FF-B-588.
- C. Bituminous Mastic: SSPC-Paint 12.
- D. Galvanizing Repair Paint: Zinc dust paint complying with SSPC-Paint 20 or DOD P-21035.
- E. Shop Primer: Rust-inhibitive, lead and chromate free, low VOC primer, complying with FS TT-P-664, or equivalent.

2.03 FABRICATED ITEMS

- A. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking, and masonry; hot-dip galvanized where used in exterior or unconditioned environment.
- B. Loose Lintels: As scheduled or as required to support wall loads; hot-dip galvanized where used in exterior or unconditioned environment.

2.04 FABRICATION - GENERAL

- A. Fabricate and shop-assemble in largest practical sections for delivery to site.
 - 1. Prepare and reinforce fabrications as required to receive applied items.
 - 2. Fabricate items with joints tightly fitted and secured.
 - 3. Make exposed joints tight, flush, and hairline.
- B. Fasteners: Use concealed fasteners if possible.
 - 1. Exposed fasteners: Flathead, countersunk type unless otherwise indicated.
- C. Anchors: Fabricate to suit conditions indicated; use anchors of same material and finish as item except where specifically indicated otherwise.
- D. Welding:
 - 1. Welding of steel: Comply with AWS D1.1 recommendations.
 - 2. Provide continuous welds at welded corners and seams.
 - 3. Exposed welds: Grind flush and smooth.
- E. Joints Exposed to Weather: Fabricate to keep water out, or provide adequate drainage of water that penetrates.

2.05 FABRICATION - SHEET METAL

- A. Comply with general fabrication requirements.
- B. Bend sheet metal corners to smallest possible radius.

2.06 FABRICATION - SHOP COATINGS

- A. Hot-dip galvanized steel and iron assemblies set in concrete and masonry.
- B. Shop prime all iron and steel fabrications.
- C. Prepare surfaces to be coated as follows:
 - 1. Solvent-clean in accordance with SSPC-SP 1.

2. Exterior fabrications: Clean in accordance with SSPC-SP 5, SSPC-SP 6, SSPC-SP 8, or SSPC-SP 10.
 3. Interior fabrications: Clean in accordance with SSPC-SP 3, SSPC-SP 5, SSPC-SP 6, SSPC-SP 8, or SSPC-SP 10.
- D. Shop Priming: Comply with SSPC-PA 1.
1. Apply primer immediately following surface preparation.
 2. Do not prime surfaces to be welded.
 3. Do not prime surfaces in direct contact bond with concrete.
 4. Apply extra coat to corners, welds, edges, and fasteners.
- E. Shop Painting: Comply with SSPC-PA 1.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

- A. Anchor metal fabrications to substrates indicated; provide all fasteners required.
- B. Perform all field fabrication required for installation.
1. Fit joints tightly.
 2. Weld joints as indicated.
 - a. Weld in accordance with AWS code.
 - b. Exposed welds: Grind flush and smooth.
- C. Do not cut or weld items galvanized after fabrication that are indicated for bolted or screwed connections.
- D. Install items in correct location, plumb and level, without rack or warp.
- E. Coat aluminum surfaces in contact with concrete and masonry with bituminous mastic.
- F. Cut cored holes for posts.

3.02 CLEANING AND TOUCH-UP

- A. Touch up damage to galvanized surfaces using galvanizing repair paint in accordance with ASTM A 780.
- B. Touch up shop paint immediately after erection.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Scope
 - 1. Rough carpentry items as indicated.
 - 2. Blocking as required to support finished work.
 - 3. Blocking as required to Owner's equipment.
- B. Related Work Specified Under Other Sections
 - 1. Finish Carpentry – DIVISION 6.
 - 2. Schedule For Finishes – DIVISION 9.

1.02 QUALITY ASSURANCE

- A. Requirements for Preservative Treatment
 - 1. Preservative pressure treated lumber and plywood shall be clean and free of surface deposits.
 - 2. Each piece shall be indelibly ink stamped with the quality mark of an approved independent third party inspection agency having a follow-up testing and inspection service at the treating plant over the quality of the treated product, and whose service is certified by an approved overview agency such as American Wood Preservative Association (AWPA).
- B. Requirements for Fire Retardant Treatments
 - 1. Interior type fire retardant treated lumber and plywood shall have a flame spread rating of 25 or less when tested in accordance with ASTM E84 in a test duration of 30 minutes.
 - 2. Interior type fire retardant treated lumber and plywood shall be a low hygroscopic low corrosive type having an equilibrium moisture content of not over 28% at 92% relative humidity after testing in accordance with ASTM D3201 and meeting the treating requirements of American Wood Preservative Association (AWPA) C20 (lumber) and C27 (plywood) Type A.
 - 3. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
 - 4. After treatment, interior fire retardant lumber 2 inches thick or less shall be kiln dried to a moisture content of 19% or less, and plywood to 15% or less. Kiln temperature shall not exceed 160 degF.

5. Interior fire retardant formulations shall contain no ammonium phosphates, sulfates, or halides.
6. Use exterior type treatment for exterior locations.
7. Interior plywood panels to be Class A fire retardant.
8. Each piece shall be stamped with the indelible ink marking of an approved independent third party inspection agency (such as Underwriters Laboratories, Inc.) having a follow-up inspection service at the treating plant. Information on the mark shall comply with the building code.

C. Requirements of Regulatory Agencies

1. In addition to locations indicated or specified, provide fire retardant treated lumber and plywood in locations required by code, by governing authorities having jurisdiction, or by the OWNER'S Underwriters.

1.03 PROJECT CONDITIONS

- A. Deliver and store lumber and plywood at the project site in a manner to minimize exposure to moisture migration.
- B. Exercise special care in storing, handling and installation of preservative and fire retardant treated lumber and plywood so as to prevent moisture absorption of such items.

PART 2 - PRODUCTS

2.01 WOOD MATERIALS

A. General

1. Each piece of lumber shall bear the official trademark and grade of the manufacturer's association or inspection bureau under which it was manufactured and graded. Lumber shall be seasoned, surfaced four sides and kiln or air dried to moisture content specified in the association's rules, except that moisture content shall not exceed 19 percent.

B. Lumber Use and Species

1. Furring, Grounds, and Similar Use: Western Wood Products Association (WWPA) "Standard", "Number 2 Common" or better Douglas Fir-Larch, Hem-Fir, Pine, Engelmann Spruce, Cedar; or Southern Pine Inspection Bureau (SPIB) Number 2 Southern Pine.
2. Nailers, Blocking, Framing, Rough Bucks, and Rough Lumber Not Otherwise Specified: Western Wood Products Association (WWPA) "Utility", Number 3 or better Douglas Fir, Hem-Fir, Lodgepole Pine, Western Cedars; or Southern Pine Inspection Bureau (SPIB) Number 2KD Southern Pine.
3. Sheathing: Western Wood Products Association (WWPA) "Number 4 Common" Douglas Fir-Larch, Hem-Fir, Pine, Engelmann Spruce or Cedar.
4. Framing for Utility Shelving: "C Finish" boards, Southern Yellow Pine, Sugar Pine, Douglas Fir, Engelmann Spruce, or Western Red Cedar.

- C. Plywood Use and Species
 - 1. Sheathing: American Plywood Association (APA), PS 1-83 Product Standard, 32/16 Rated Sheathing, Exposure 1, of thickness noted.
 - 2. Exterior Plywood: American Plywood Association (APA), PS 1-83 Product Standard, BB Group 2 Exterior, of thickness noted.
 - 3. Fire Retardant Plywood: Pressure treated in accordance with American Wood Protection Association (AWPA) Standard U1, Specification H, Use Category FA (interior) or FB (exterior), of thickness noted.
 - 4. Utility Panels and Shelving: American Plywood Association (APA), PS 1-83 Product Standard, Exposure 1, Group 1, sanded, 3/4 inch thick unless otherwise noted.

- D. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
 - 2. Engineered Wood: Use exterior grade engineered wood with phenol-formaldehyde instead of interior grade urea-formaldehyde at exterior and interior conditions.

2.02 FASTENING MATERIALS

- A. General: Unless otherwise indicated, use fastening materials of types appropriate for the conditions encountered, including wood to wood, wood to masonry or concrete, and wood to metal. Use anchors as shown for securing blocking, nailers and framing. Threaded stud bolts and nuts, or powder actuated fasteners, shall be used for securing wood to structural framing.
- B. Screws for Fire Retardant Lumber: Hot-Dipped Galvanized carbon steel, stainless steel, silicon bronze or copper in accordance with ASTM A 153 or ASTM B 695, Class 55 minimum (except for bolts 0.50 inch diameter or larger).
- C. Threaded Studs: Threaded studs for securing wood nailers or other items noted, complete with nut and washer.
 - 1. Erico Products, Inc. "Blue Arc Shear Connector Studs", (440-248-0100).
 - 2. Midwest Fasteners, Inc., "Weld Studs", (800-852-8352).
- D. Powder Actuated Fasteners: Drive pin type, threaded, of length to penetrate the steel member and depth of wood member, and a washer of sufficient diameter to secure the wood member. Fasteners and low-velocity powder actuated tools by same manufacturer.
 - 1. Hilti, Inc.
 - 2. Ramset, Inc.

- E. Nails and Staples: Galvanized carbon steel, per Federal Specification FF-N-105B.
- F. Screws for Other Lumber: Galvanized carbon steel per Federal Specification FF-S-107C and natural bright finish carbon steel per Federal Specification FF-S-111C.
- G. Bolts, Washers, Expansion Shields, and Nuts: Zinc-coated carbon steel, per Federal Specification FF-B-561C, FF-B-575C, FF-W-92A, FF-B-588C and FF-N-836D.
- H. Bar or Strap Anchors: ASTM A36 carbon steel 1/8 inch thick unless otherwise noted, hot dipped galvanized, with 2.0 ounce zinc coating per square foot of surface, per ASTM A123.
- I. Adhesives: Use aliphatic or phenolic resin wood glue for general carpentry; comply with south coast air quality management district requirements for voc limits in adhesives. For wood work 30 grams/liter is the maximum VOC content.

2.03 WOOD TREATMENTS

A. Preservative Treatment

- 1. Preservative Treatment: Use preservative pressure treated wood nailers, blocking, rough bucks, furring, grounds and other rough lumber items that come in contact with concrete, masonry or metal and are inaccessible in the finished work. Preservative pressure treatment shall be in accordance with American Wood Preservers Association (AWPA) Standards P5, C1, C2 and C9. Each piece shall be stamped with indelible ink with American Wood Preservative Association (AWPA) Quality Mark. Perform all milling along the grain of the wood prior to preservative pressure treatment.
 - a. Hickson Corporation, "Wolman-CCA Preservative".
 - b. Hoover Treated Wood Products Inc., "Dixie CCA".
 - c. Osmose Wood Preserving Company of America, Inc. "Osmose CCA".

B. Fire Retardant Treatment

- 1. Fire Retardant Treatment: Use fire retardant wood for nailers, blocking, rough-bucks, grounds and other rough lumber items in areas requiring fire retardant rating and that are not exposed to the weather. Kiln dry, after treatment, to a moisture content of 19% or less for lumber and to 15% or less for plywood.
 - a. Interior Treatment:
 - 1) Hickson Corporation, "Drecon".
 - 2) Hoover Treated Wood Products, Inc., "Pryo-Guard".
 - 3) Osmose Wood Preserving Company of America, Inc. "Fire-Pro".
 - b. Exterior Treatment:
 - 1) Hoover Treated Wood Products, Inc., "Exterior Fire-X".

C. Back Painting

- 1. Primer-Sealer: Apply one coat in the shop, on back surfaces and edges of rough lumber items that are not treated as described above.
 - a. ICI Dulux "Ultra-Hide Alkyd Wood Undercoater".
 - b. PPG Industries, Inc. "Speedhide 6-6 Interior Undercoater".
 - c. Benjamin Moore "Alkyd Enamel Underbody 217".

- d. Sherwin-Williams "Promar 200".

PART 3 - EXECUTION

3.01 PREPARATION

- A. Provide rough hardware required to complete this Work, including attachments of wood to wood, wood to masonry or concrete and wood to metal. Counterbore holes for nuts and heads of fasteners, and countersink all screws so as to be flush. Drill holes in lumber for fasteners. Furnish rough hardware items, loose, that are scheduled to be pre-set in masonry or concrete, to expedite the installation of such Work.
 - 1. In pressure treated wood, drill undersize holes for screws and nails to prevent splitting of wood members.
- B. For back painted members, after any such members are cut in the field, apply a brush coat of the same material used in the shop, to reseal the surface.
- C. When preservative pressure treated lumber is cut across the grain in the field, apply preservative to cut end in accordance with American Wood Preservers Association (AWPA) Standard M4 Section 1.5.
- D. For fire retardant pressure treated lumber cut across the grain in the field, no supplemental end treatment is required.
- E. Field cutting (ripping) along the grain is not allowed for either fire retardant or preservative pressure treated lumber.

3.02 FURRING AND GROUNDS

- A. Provide wood furring and grounds required to install wood sheathing, gypsum wall board, gypsum and metal lath, and wood paneling to masonry or concrete. Install in parallel rows, spaced at 16 inches on center; and in addition, to frame the perimeters of such areas and corners. Use nominal 1 inch by 3 inch solid stock unless otherwise noted. At metal lath, provide beveled edge to develop good plaster keys.
- B. Provide wood furring required to install cabinet work and other finish items to masonry, concrete, gypsum wall board or plaster substrates to properly secure these items.
- C. Secure members rigidly in place, at 2 feet on center, maximum, using flush bolts. Where members are applied over stud partition framing, bolt members in place through the substrate and into the metal stud framing.

3.03 NAILERS, BLOCKING, FRAMING AND ROUGH BUCKS

- A. Provide nailers, blocking, framing, rough bucks, sheathing and other rough lumber necessary for a complete installation.
- B. Verify with Owner any equipment requiring blocking that will be installed after construction. Provide and install suitable blocking as directed by Owner.

- C. Anchor wood members to concrete, masonry, or steel as shown, or required, complete with the fasteners specified. If powder actuated fasteners are used, comply with safety requirement of OSHA and fastener manufacturer. Where size and spacing are not shown or noted, secure members with 1/2 inch diameter bolts or threaded studs; not less than two for each individual piece; and at not more than 24 inches on center, maximum, for continuous members. Provide washers under bolt heads and nuts. Provide nailers and blocking in long lengths to minimize joints. When joints are necessary, join pieces without projecting edges.
- D. Lay sheathing close and nail solidly at each bearing; at not over 6 inches on center at continuous bearing members. Stagger end joints of adjacent sheets, with joint over bearings, in all cases.

3.04 INSTALLATION

- A. Temporary Ventilation: During and immediately after installation of treated wood, engineered wood products, and laminated wood products at interior spaces, provide temporary ventilation.
- B. Waste Management: As specified in Division 01 – Waste Management and as follows:
 - 1. Select lumber sizes to minimize waste; reuse scrap lumber to the greatest extent possible. Clearly separate scrap lumber for use on site as accessory components, including, shims, bracing and blocking.
 - 2. Do not leave any wood, shavings, sawdust, etc., on the ground or buried in fill. Prevent sawdust and wood shavings from entering the storm drainage system.
 - 3. Do no burn scrap lumber that has been pressure treated.
 - a. Do not send lumber treated with pentachlorophenol, CCA or ACA to cogeneration facilities or "waste-to-energy" facilities.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Firestopping materials.
- B. Firestopping of all penetrations and interruptions to fire rated assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED SECTIONS

- A. Division 4 – Unit Masonry: Masonry penetrations.
- B. Division 23 Mechanical – Firestopping of mechanical and plumbing work.
- C. Division 26 Electrical – Firestopping of electrical work.

1.03 REFERENCES

- A. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2000.
- B. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 1997.
- C. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- D. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- E. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Regional Materials: Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site. Indicate location of raw materials and indicate distance to the manufacturers' site.
- D. VOC Data: Submit manufacturers' product data for sealant indicating the calculated VOC limits and compliance with VOC emission limits for project.

1.05 QUALITY ASSURANCE

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

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 - PRODUCTS

2.01 FIRESTOPPING ASSEMBLIES

- A. Firestopping: Provide product indicated on tested assemblies noted on Drawings.
 - 1. Fire Ratings: See Drawings for required systems and ratings.
 - 2. Use only products specifically included with the tested assemblies indicated.

2.02 MATERIALS

- A. VOC emission limits: Interior Architectural Sealants are to comply with Bay Area Resources Board Reg. 8, Rule 51.
 - 1. VOC limit for sealant and caulk: 250 grams/liter.
 - 2. VOC limit for primer on non-porous surfaces: 250 grams/liter.
 - 3. VOC limit for primer on porous surfaces: 775 grams/liter.
- B. Toxicity Compliance:
 - 1. Comply with Bay Area Resources Board requirements to limit use of toxic substances. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium, and their components are not permitted.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.
- B. Remove incompatible materials which may affect bond.
- C. Install backing materials to arrest liquid material leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authority having jurisdiction.
- C. Install labelling required if by code.

3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces of firestopping materials.
- B. Protect adjacent surfaces from damage by material installation.
- C. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.

END OF SECTION

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SECTION 07 92 00

JOINT SEALERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Internal component seals.
- B. Interior seals at perimeter of window systems.
- C. Structural silicone seal/adhesive applications.
- D. Sealants at ceramic tile installations.
- E. Sealant backers required for proper joint configuration and as bond breaker.

1.02 REFERENCES (LATEST EDITION)

- A. American Society for Testing and Material (ASTM):
 - 1. C719 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement.
 - 2. C794 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
 - 3. C920 Standard Specification for Elastomeric Joint Sealants.
 - 4. C1248 Standard Test Method for Staining of Porous Substrate by Joint Sealants.
 - 5. C1087 Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
 - 6. C1193 Standard Guide for Use of Joint Sealants.

1.03 PERFORMANCE REQUIREMENTS

- A. Conformance with the requirements of this Article shall be demonstrated, where applicable, by submitting appropriate manufacturer's test reports, product technical data, and certification letters.
- B. Sealed Joint Design:
 - 1. Design and install joint widths to accommodate expected movements, without failure of joint sealant.
 - 2. In no case shall a sealed joint, susceptible to movement, be installed at less than 1/4" (6mm).
 - 3. Sealant and backer shall be installed of proper configuration to maximize compression/extension of sealant capability and to minimize stress at bond line on substrates.
 - 4. Elastomeric joint sealants: Sealants that provide and maintain watertight and airtight joints and seals without the deterioration and staining of adjacent materials.

5. Interior joint sealants and caulks: Sealants and caulks that provide and maintain watertight and airtight joints and seals without the deterioration and staining of adjacent materials.
- C. Adhesion:
1. When tested in conformance to ASTM C794, joint sealant shall not fail in adhesion.
- D. Compatibility:
1. When tested in conformance to ASTM C1087, sealants shall be shown to be compatible with project materials coming in contact with the sealant such as backers, gaskets, and setting blocks.
- E. Staining:
1. When tested in conformance to ASTM C1248, porous substrates shall show no permanent staining.

1.04 SUBMITTALS

- A. Product Data:
1. Submit manufacturer's published product data sheets for confirmation of intent of products to be provided on project.
 2. Include color charts for manufacturer's full range of color options, including both standard and special order.

1.05 QUALITY ASSURANCE

- A. Qualifications:
1. Installer shall be able to demonstrate not less than five (5) years successful experience in the installation of comparable projects.
 2. Employ craftsmen who are thoroughly skilled and completely familiar with the specified requirements. Provide the services of a competent foreman or supervisor who shall be available at all times during the progress of the work of this Section.
 3. Manufacturer shall be capable of providing the following:
 - a. Field service representation during construction
 - b. Performing laboratory tests as specified herein
 - c. Review and comment of contractor's shop drawings, as requested, relating to sealant details
 4. All sealant for the work of this section shall be provided by one manufacturer.
- B. In addition to manufacturer's recommendations, conform to guidelines of the FGMA Sealant and Glazing Manuals.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store all materials in a manner to prevent damage or deterioration, in conformance with manufacturer's instructions.
- B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Batch numbers and expiration date shall be clearly marked on manufacturer's packaging.
- D. Provide Material Safety Data Sheet for each product.

1.07 SITE CONDITIONS

- A. Do not install sealants or other materials in environmental conditions (temperature, humidity, ventilation, wind) that are beyond the limitations set by the manufacturer.

1.08 WARRANTY

- A. Manufacturer shall warrant for 1 year from date of substantial completion, that the installed sealants will perform as watertight weatherseals and will not change colors when used with back-up materials and substrates that have been approved for compatibility.
- B. Defects may be defined as follows; however, this list is not inclusive of all potential problems:
 - 1. Adhesive or cohesive failure
 - 2. Staining of substrates beyond samples as tested for project
 - 3. Color change of sealants or adjacent materials
 - 4. Failure of sealant to cure

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Sealant Manufacturers:
 - 1. Dow Corning Corp.
1255 Northmeadow Parkway, Suite 104
Roswell, GA 30076
(770) 751-7979
 - 2. Pecora Corporation
165 Wambold Road
Harleysville, PA 19438
(800) 523-6688

3. Sonneborn, Division of ChemRex, Inc.
889 Valley Park Drive
Shakopee, MN 55379
(800) 433-9517
4. Tremco
3735 Green Road
Beachwood, OH 44122
(800) 321-7906
5. General Electric Co.
260 Hudson River Rd.
Waterford, NY 12188
(800) 255-8886
6. Polymeric Systems, Inc
47 Park Avenue
PO Box 522
Elverson, PA 19520
(800) 228-5548
7. Sika Corporation, USA
201 Polito Avenue
Lyndhurst, NJ 07071
(800) 933-7452
8. DAP Products, Inc.
2400 Boston Street
Suite 200
Baltimore, MD 21224
(800) 543-3840

2.02 MATERIALS

- A. VOC emission limits: Interior Architectural Sealants are to comply with Bay Area Resources Board Reg. 8, Rule 51.
 1. VOC limit for sealant and caulk: 250 grams/liter.
 2. VOC limit for primer on non-porous surfaces: 250 grams/liter.
 3. VOC limit for primer on porous surfaces: 775 grams/liter.
- B. Toxicity Compliance:
 1. Comply with Bay Area Resources Board requirements to limit use of toxic substances. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium, and their components are not permitted.

C. Materials, General:

1. Provide joint sealants that are compatible with backing material, accessories, substrates and adjacent sealants for the intended uses based on the testing, recommendations experience and written instructions of the sealant manufacturer.
2. Colors for Exposed Joint Sealants: Provide joint sealant colors as selected by the Architect-Engineer from the manufacturer's full range of colors to match adjoining materials.

D. Sealant Compound:

1. Two-Part Polysulfide Sealant: ASTM C920, Type M, Grade NS, Class 25, Use T, NT, M, A, G, and O as appropriate. Furnish in standard colors as selected.
 - a. Polymeric Systems, Inc. Polysulfide PSI-350 Sealant. (96 VOC)
 - b. Sonneborn, Division of ChemRex, Inc. "Sonolastic Two Part" (100 VOC)
2. One-Part Polysulfide Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, A, G and O as appropriate. Furnish in standard colors as selected.
 - a. Polymeric Systems, Inc. "PSI-7000 Polysulfide Rubber". (36 VOC)
 - b. W.R. Meadows Inc., "Deck-O-Seal One Step". (Verify less than 250 VOC)
3. Multi-Part Polyurethane Sealant: ASTM C920, Type M, Grade NS, Class 25, Use T, NT, M, G, A, and O as appropriate. Furnish in standard colors as selected.
 - a. Pecora Corp. "Dynatrol II Sealant" (14 VOC)
 - b. Polymeric Systems, Inc. "270 Multi-Component Urethane". (96 VOC)
 - c. Tremco "Dymeric" or "Dymeric 240 FC" (Verify less than 250 VOC)
 - d. Sika "Sikaflex 2CNS". (Verify less than 250 VOC)
4. One-Part Polyurethane Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A, and O as appropriate. Furnish in standard colors as selected.
 - a. Pecora Corp. "Dynatrol 1".(Verify less than 250 VOC)
 - b. Polymeric Systems, Inc. "PSI-901/RC-1 One Part Urethane". (35 VOC)
 - c. Sonneborn, Division of ChemRex, Inc. "Sonolastic TXI" (36 VOC)
 - d. Sika "Sikaflex 1A". (Verify less than 250 VOC)
 - e. Sika "Sikaflex 15LM". (Verify less than 250 VOC)
5. One-Part Silicone Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A, and O as appropriate. Furnish in standard colors as selected.
 - a. Dow Corning Corp. "795 Building Sealant" (43 VOC)
 - b. General Electric Silicone Products Department "Silpruf Sealant" (Verify less than 250 VOC)
 - c. Pecora Corp. "864 Silicone Sealant" (12 VOC)
 - d. Tremco "Spectrem 1" (Verify less than 250 VOC)
6. One-Part Mildew-Resistant Silicone Sealant: Mildew-resistant formulation; ASTM C920, Type S, Grade NS, Class 25, Use NT, M, A, and O. Furnish in

standard colors as selected. Use to seal joints in damp areas such as around ceramic tile, showers, tubs, sinks and other plumbing fixtures.

- a. Dow Corning Corp. "786 Mildew Resistant Sealant". (Verify less than 250 VOC)
- b. General Electric Silicone Products Department "Sanitary 1700 Sealant"
- c. Pecora Corp. "898 Silicone". (12 VOC)

7. Chemical Resistant Sealant:

- a. Pecora Corp. "GC-2 Synthacaulk". (Verify less than 250 VOC)

E. Caulking Compound:

1. Acrylic Latex Caulk: Non-sag, 1-part latex base caulk, per ASTM C834 Furnish in standard colors as selected.
 - a. DAP Inc. "ALEX Acrylic Latex Caulk" (Verify less than 250 VOC)
 - b. Pecora Corp. "AC-20 Acrylic Latex Caulk" (31 VOC)
 - c. Sonneborn "Sonolac" (180 VOC)
 - d. Tremco "Acrylic Latex Caulk Tremflex 834" (Verify less than 250 VOC)

F. Sealant Backers

1. Provide backers complying with ASTM C1330 Type C of size and density to control sealant. Round, solid section, skinned surfaced, soft foam gasket as recommended by sealant manufacturer and as passed on project compatibility tests. Closed cell gassing rods are not acceptable.
2. Provide sufficient sizes and diameters of backers to accommodate varying joint widths on project, such that backers are compressed about 25% for all installations.

G. Primers, Cleaning, Masking Supplies

1. Provide primer for specific sealant/substrate conditions as recommended by sealant manufacturer and as determined by project sample testing.
2. Provide solvents, cloths, and other supplies as recommended or acceptable by sealant manufacturer for proper joint preparation.
3. Do not use solvents that are harmful to paint finishes or other components that will be contacted.
4. Masking tape shall not leave residue when removed.

H. Bond Breaker Tape

1. Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant bond that would result in joint failure.

I. Expansion Joint Filler

1. Provide preformed expanding foam tape sealant at joints identified as building expansion joints.

2. Foam is to be open-cell polyurethane with water-based stabilized acrylics.
3. Provide in precompressed reel forms with self-adhesive backing for use in preformed joints.
4. Install in strict accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Before commencing sealant installation in any assigned area, examine substrates' condition and joint width which may affect sealed joint performance. Correct deficiencies before proceeding.
- B. Compare shop drawings with actual conditions. Advise Architect of discrepancies.
- C. Coordinate interior application of joint sealants with interior finishes schedule.

3.02 PREPARATION

- A. Cleaning
 1. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.
 2. Clean joint surfaces just prior to sealant installation to remove all laitance and surface dirt.
 - a. Non-porous substrates shall be cleaned with a solvent as recommended or acceptable by sealant manufacturer, and as required depending upon contaminants to be removed. Use "two-cloth" cleaning method as described herein.
 - b. Porous substrates shall be cleaned by dusting or solvent, or both as dictated by field testing and as recommended or acceptable to sealant manufacturer. Abrasion cleaning may be required to remove surface treatments or coatings.
 3. "Two-Cloth" Cleaning Method
 - a. Use clean, soft, absorbent, lint-free cloths. This method consists of a solvent cloth wipe followed by a dry cloth wipe.
 - b. Thoroughly clean all surfaces of loose debris.
 - c. Pour or dispense acceptable cleaning solvent onto the cloth. A plastic squeeze bottle works best for organic cleaning solvents. Do not dip cloth into solvent container, as this will contaminate the cleaning agent.
 - d. Wipe vigorously to remove surface contaminants. Rotate the cloth to clean area before re-wiping.
 - e. Immediately wipe the cleaned area with a separate clean, dry cloth. Organic solvent must be removed with the dry cloth before the solvent evaporates.

- B. Indoor Air Quality:
 - 1. Temporary ventilation: Provide temporary ventilation during work of this Section.
- C. Priming
 - 1. If primer is required per project substrate adhesion testing, mask adjacent surfaces where aesthetics is a consideration to keep excess primer or sealant off these surfaces.
 - 2. Apply primer (if required) to cleaned, dry substrates using a clean, dry cloth or brush. Do not apply too thick of coat. A white, powdery film will form if primer has been applied too thick. Remove excess primer with clean cloth.
 - 3. Allow primer to dry until all solvent is evaporated; this may take 5 to 30 minutes, depending on weather conditions.
 - 4. After inspecting for dryness, the joint is ready for backer and sealant installation. Sealant must be installed same day as joint preparation.

3.03 INSTALLATION

- A. Comply with the requirements of ASTM C1193 for proper sealant and backer installation.
- B. Sealant Backers
 - 1. Install proper diameter or size backer to depth in joint to develop a proper sealant bead configuration.
 - 2. Do not stretch, twist, or puncture sealant backers.
 - 3. If backers become wet due to exposure, remove and replace with dry material.
 - 4. Install bond breaker tape where required to prevent three-sided adhesion in moving joints.
- C. Installation of Sealants
 - 1. Completely fill voids in joints to ensure full adhesion and proper joint profile.
 - 2. Tool sealant concave, pushing sealant into void. Do not wet tooling aids as this may interfere with sealant cure and adhesion.

3.04 FIELD QUALITY CONTROL

- A. Do not allow excess sealant to contact adjacent surfaces if aesthetics is a consideration. However, should this occur, remove immediately by method of solvent, abrasion, or both as applicable. Solvents will not fully remove sealants or primers from porous surfaces.
- B. Remove masking tape before sealant cures.

C. Dispose of all trash and solvent wipe rags in non-combustible containers.

3.05 PROTECTION

A. Protect the installed sealants from damage or contamination during course of construction.

END OF SECTION

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SECTION 08 11 14

METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Hollow Metal Steel Door Frames.

1.02 REFERENCES

- A. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 1998.
- B. ANSI A250.11 - Recommended Erection Instructions for Steel Frames; 2001 (until publication use SDI 105).
- C. ASTM A 366/A 366M - Standard Specification for Commercial Steel (CS) Sheet, Carbon, (0.15 Maximum Percent) Cold-Rolled; 1997.
- D. ASTM A 569/A 569M - Standard Specification for Steel, Carbon (0.15 Maximum Percent), Hot-Rolled Sheet and Strip Commercial; 1998.
- E. ASTM A 591/A 591M - Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Weight (Mass) Applications; 1998.
- F. ASTM A 620/A 620M - Standard Specification for Drawing Steel (DS), Sheet, Carbon, Cold-Rolled; 1997.
- G. 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.
- H. DHI A115.1G - Installation Guide for Doors and Hardware; Door and Hardware Institute; 1994.
- I. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- J. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; 1999.
- K. SDI 111 - Recommended Standard Details for Steel Doors & Frames; Steel Door Institute; current edition.
- L. SDI 113 - Test Procedure and Acceptance Criteria for Apparent Thermal Performance of Steel Door and Frame Assemblies; Steel Door Institute; 1979.

- M. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's standard details and catalog data demonstrating compliance with referenced standards; installation instructions.
- B. Certificates:
 - 1. Provide manufacturer's certification that products comply with referenced standards.
 - 2. Provide evidence of manufacturer's membership in the Steel Door Institute.
- C. Shop Drawings: Submit for approval of the following:
 - 1. Shop drawings showing all openings in the door schedule and/ or drawings; provide details of door design, door construction and methods of assembling sections, hardware locations, anchorage and fastening methods, door frame types, and finish requirements.
 - 2. Shop drawings shall use and reference the door and frame identification as found on the Architect's plans.
- D. Door, frame, and hardware schedule in accordance with SDI 111.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide all products from a single manufacturer who is a member of the Steel Door Institute.
- B. Fire-rated Assemblies: Manufactured in accordance with Underwriter's Laboratories Inc. and bearing their label.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon delivery, inspect all materials for damage; notify shipper and supplier if damage is found.
- B. Protect products from moisture, construction traffic, and damage.
- C. Store vertically under cover. Do not use non-vented plastic or canvas shelters. Should wrappers become wet, remove immediately.
- D. Place units on 4 inch high wood sills or in a manner that will prevent rust or damage. Provide 1/4 inch space between doors to promote air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: One of the following:
 - 1. Amweld Building Products, Inc.
 - 2. Ceco Door Products.
 - 3. Curries Company.
 - 4. Republic Builders Products.
 - 5. Steelcraft.

2.02 MATERIALS

- A. Steel Sheet for Doors and Frames:
 - 1. Cold rolled steel: ASTM A 366/A 366M or ASTM A 620/A 620M.
 - 2. Hot rolled steel: Pickled and oiled, ASTM A 569/A 569M, Type B.
 - 3. Galvanized steel: Hot-dipped, ASTM A 653/A 653M, with G60/Z180 or A40/ZF120 coating, minimum.
- B. Steel Sheet for Anchors and Accessories: Electrolytically deposited zinc coated steel; ASTM A 591/A 591M, coating 40Z (12G), minimum.

2.03 DOORS AND FRAMES

- A. Comply with ANSI A250.8.
- B. Fire-Rated Openings: Comply with NFPA 80; UL or ITS (Warnock Hersey) listed.
 - 1. Affix permanent labels attesting to fire resistance.
 - 2. At stairway enclosures, provide units listed for 450 degree F maximum temperature rise rating for 30 minutes of exposure.
 - 3. Provide manufacturer's certificate that oversized openings have been constructed in accordance with all other applicable requirements for labeled door construction.
- C. Frames for Wood Doors Specified Elsewhere: 16 gage, Level 3 steel frames.
- D. Interior Frames: Provide welded unit type frames.
- E. Glazed Lights: Provide glazing stops and beads for indicated lights.
- F. Prepare frames, complete with internal reinforcements, using designated templates, to receive required finish hardware.
- G. Finishing: Provide factory-primed units for field finishing.

1. Prime finish must comply with project limitations for volatile organic compounds (VOC) specified in Section 01 61 16 – VOC Content Restrictions.
2. VOC Limitations only apply once the specified products are placed within the building envelope.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are suitable before beginning installation of frames.
 1. For wrap-around frames, verify that completed openings are of correct size and thickness.
 2. For butt type frames, verify that completed openings are of correct size.
- B. Correct unsatisfactory condition before proceeding with installation.

3.02 INSTALLATION

- A. Install frames plumb, level, rigid, and in true alignment as recommended in ANSI A250.11 and DHI A115.1G.
- B. Fill welded frames in masonry construction with mortar as masonry is laid-up.
 1. Mix grout to provide 4 inch maximum consistency and hand trowel into place.
 2. Do not use grout mixed to thin "pumpable" consistency.

3.03 ADJUST AND CLEAN

- A. Adjust doors and frames for proper operation, free from binding or other defects.
- B. Clean and restore soiled or damaged surfaces. Remove scraps and debris, and leave site and a clean condition.
- C. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.

END OF SECTION

SECTION 08 14 00

WOOD DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors with wood veneer, non-rated.

1.02 RELATED SECTIONS

- A. Section 08 11 14 – Metal Doors and Frames.

1.03 REFERENCES

- A. ASTM E 413 - Classification for Rating Sound Insulation; Latest edition.
- B. ASTM E 1408 - Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems; Latest edition
- C. AWI P-208 - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute; Latest edition.
- D. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; Latest edition.
- E. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; Latest edition.
- F. UL 10B - Safety Fire Tests for Door Assemblies - Neutral Pressure; Latest edition.

1.04 SUBMITTALS

- A. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, and identify cutouts for glazing.
- C. Samples: Submit three samples of door veneer, 8 x 10 inch in size, to be used for sampling applied finish color and sheen.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Section 1300 “Architectural Flush Doors”, Custom Grade.

- B. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum ten years of experience.
- C. Single Source Responsibility: Obtain doors from 1 (one) source and by a single manufacturer.

1.06 REGULATORY REQUIREMENTS

- A. Door Glazing: Comply with CFR 16CFR 1201 and other applicable safety requirements. Each piece of safety glazing shall be permanently labeled with appropriate marking.
- B. Sound Transmission Class: Provide certificate that door assemblies have been tested in accordance with ASTM E413 and ASTM E1408 to achieve minimum sound transmission class of STC 31.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Package, deliver and store doors in accordance with AWI P-200, Section 1300.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.08 PROJECT CONDITIONS

- A. Coordinate the work with door opening construction, door frame and door hardware installation
- B. Do not deliver and install wood doors until site conditions have been stabilized and will be maintained at:
 - 1. Temperature: 60 to 90 degrees F, (15 to 32 degrees C).
 - 2. Relative Humidity: 25 to 50 percent.

1.09 DEFINITIONS

- A. Warp: Any distortion in door plane independent of doorframe such as bow, cup, and twist.
- B. Bow: Curvature along length of door measured as deviation from straight line extended from top to bottom of door.
- C. Cup: Curvature along width of door measured as deviation from straight line extending from one door side to opposite side.
- D. Twist: Deviation of one or two door corners being out of plane from other corners.

1.10 WARRANTY

- A. Provide warranty for the following term:
 - 1. Interior Doors: Lifetime.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
- C. Warranty to cover repair or replacement of defective interior wood doors for life of initial installation including:
 - 1. Materials and workmanship.
 - 2. Bowing, cupping, and twisting greater than 1/4 inch for 42 by 84 inches door panel.
 - 3. Telegraphing of core through veneer exceeding 0.01 inch in 3 inches.
 - 4. Delamination.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Wood Doors:
 - 1. Basis of Design: Marshfield-Algoma, Signature Series
 - 2. Other acceptable manufacturer's based on ability to match visual characteristics of design standards:
 - a. VT Industries.
 - b. Oshkosh.
 - c. Masonite.

2.02 DOOR TYPES

- A. Flush Interior Doors: 1-3/4 inches thick; solid core construction.

2.03 DOOR CORES

- A. Non-Rated Solid Core and 20-45 Minute Rated Flush Doors with Wood Veneer: AWI Architectural Woodwork Quality Standards Illustrated, Section 1300 Type PC-5 – Custom Grade / WDMA IS-1A, WIC Section 20.
 - 1. Particleboard Core: Hot-pressed 5-ply construction meeting ANSI A208.1 grade 1- LD-2 (32 lb. density).

2.04 DOOR FACINGS

- A. Interior Doors – Face Veneer: Cherry species, veneer grade as specified by door quality standard, plain sliced, with slip matched grain, for translucent finish.

- B. Match existing veneer doors in Restrooms 128 and 129.

2.05 FABRICATION

- A. Fabricate doors in accordance with AWI Quality Standards requirements.
- B. Provide solid blocks at lock edge for hardware reinforcement.
 - 1. Provide solid blocking for other through-bolted hardware.
- C. Vertical Exposed Edge of Stiles - Veneer Faces: Of same species as veneer facing.
- D. Top and bottom rails to be factory-sealed. Fit door edge trim to edge of stiles after applying veneer facing.
- E. Bond edge banding to cores.
- F. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- G. Factory fit doors for frame opening dimensions identified on shop drawings.
- H. Provide edge clearances in accordance with AWI Standards.

2.06 FINISH

- A. Factory applied transparent TR6 catalyzed polyurethane clear coat finish.
- B. Transparent Finish: Match existing door stain (reddish-brown colored).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and AWI requirements.
 - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Trim door height by cutting bottom edges to a maximum of 5/8 inch (19 mm).
 - 1. Trim fire door height at bottom edge only, in accordance with fire rating requirements.

- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Install door louvers plumb and level.

3.03 INSTALLATION TOLERANCES

- A. Conform to AWI Standard for maximum diagonal distortion.
- B. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 x 84 inches surface area.
- C. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 x 84 inches surface area.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

3.05 SCHEDULE - SEE DRAWINGS

END OF SECTION

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SECTION 08 31 00

ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Access door and frame units in wall and ceiling locations.

1.02 REFERENCES

- A. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- B. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTALS

- A. See Section 01 34 00 – Submittals, for common submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Project Record Documents: Record actual locations of all access units.

1.04 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated access doors.
 - 1. Provide access doors of fire rating equivalent to the fire rated assembly in which they are to be installed.
- B. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of fire rated doors.

1.05 PROJECT CONDITIONS

- A. Access doors are to be provided where necessary to access equipment that would otherwise be enclosed by the construction, whether or not indicated on the Drawings.
- B. Coordinate the work with other work requiring access doors.
- C. Field verify required locations and sizes of access doors with all trades before installation. Notify Architect or Engineer of deviations to plans before ordering.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Access Doors:
 - 1. Acudor Products Inc; www.acudor.com.
 - 2. Karp Associates, Inc.
 - 3. Milcor Inc; www.milcorlp.com.
 - 4. Manufacturers whose products comply with these product specifications.

2.02 ACCESS DOOR UNITS – WALLS AND CEILINGS

- A. Door and Frame Units: Formed steel.
 - 1. Frames and flanges with drywall corner bead: 16 gauge cold-rolled steel.
 - 2. Door panels: 14 gauge cold-rolled single thickness steel sheet.
 - 3. Size: as required for access, or as indicated on drawings.
 - 4. Hardware:
 - a. Hinge: Concealed constant force closure spring piano type.
 - b. Lock: Screwdriver slot for quarter-turn cam lock.
- B. Door and Frame Finish:
 - 1. Shop primed for field painting.
 - 2. Prime coat with rust-inhibitive electrostatic powder, baked grey enamel.
- C. Provide fire rated units when in fire rated construction. Match rating of surrounding construction.

2.03 FABRICATION

- A. Weld, fill, and grind joints to ensure flush and square unit.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings for door and frame are correctly sized and located.

3.02 INSTALLATION

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

- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

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SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Hardware for interior doors.
- B. Automatic door operators and accessories for interior doors.

1.02 REFERENCES

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; Latest published version.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; Builders Hardware Manufacturers Association, Inc.; Latest published version (ANSI/BHMA A156.1).
- C. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.2).
- D. BHMA A156.4 - American National Standard for Door Controls - Closers; Builders Hardware Manufacturers Association, Inc.; Latest published version (ANSI/BHMA A156.4).
- E. BHMA A156.5 - American National Standard for Auxiliary Locks & Associated Products; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.5).
- F. BHMA A156.6 - American National Standard for Architectural Door Trim; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.6).
- G. BHMA A156.7 - American National Standard for Template Hinge Dimensions; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.7).
- H. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; Builders Hardware Manufacturers Association, Inc.; Latest published version (ANSI/BHMA A156.8).
- I. BHMA A156.12 - American National Standard for Interconnected Locks & Latches; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.12).
- J. BHMA A156.13 - American National Standard for Mortise Locks & Latches; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.13).
- K. BHMA A156.15 - American National Standard for Closer Holder Release Devices; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.15).
- L. BHMA A156.21 - American National Standard for Thresholds; Builders Hardware Manufacturers Association; Latest published version (ANSI/BHMA A156.21).

- M. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; current edition.
- N. DHI A115W Series - Specifications for Wood Door and Frame Preparation for Hardware; Door and Hardware Institute; Latest published version.
- O. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; Door and Hardware Institute; Latest published version.
- P. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Wood Flush Doors; Door and Hardware Institute; Latest published version.
- Q. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- R. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; Latest published version.
- S. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; Latest published version.
- T. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTALS

- A. See Section 01 34 00 Submittals for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, electrical characteristics and connection requirements.
- C. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- D. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- B. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with five years of experience. The Supplier shall have in their employment an A.H.C. who will be made available at reasonable times to consult with the Architect / Contractor or Owner regarding all matters affecting the Finish and EAC Hardware on this Project.
- C. **The Hardware Supplier shall install all Finish Hardware using installers fully familiar with and capable of correctly installing all Finish Hardware. The General Contractor shall not install the Finish Hardware.**
- D. Fire Rated Assemblies: Upon completion of the installation, all fire doors assemblies shall be inspected to confirm proper operation of the closing device and latching device and that only the manufacturers furnished fasteners are used for installation and that it

meets all criteria of a fire door assembly per NFPA 80 2007 Edition. A written record shall be maintained and given to the owner to be made available to the AHJ. The inspection of the swinging fire doors, with, builders' hardware devices, shall be performed by individuals with knowledge and understanding of the opening components of the types of doors being tested.

1.05 DELIVERY, STORAGE, AND PROTECTION

- A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.06 COORDINATION

- A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
- B. Coordinate the automatic door operators with the electrical trade for 110/120V power to operator motor.
- C. Furnish templates for door and frame preparation.
- D. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.07 WARRANTY

- A. Provide ten year warranty for door closers.
- B. Provide ten year warranty for automatic door operators.

1.08 MAINTENANCE PRODUCTS

- A. Provide special wrenches and tools applicable to each different or special hardware component.
- B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR DOOR HARDWARE PRODUCTS

- A. Provide products that comply with the following:
 - 1. Applicable provisions of Federal, State, and local codes.
 - 2. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and Facilities.
 - 3. Applicable provisions of NFPA 101, Life Safety Code.
 - 4. Fire-Rated Doors: NFPA 80.

5. All Hardware on Fire-Rated Doors: Listed and classified by UL as suitable for the purpose specified and indicated.
6. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

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. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.
- D. 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."
- E. Provide and install metallic surface-mounted wire molding to conceal low voltage wiring between operator and actuators.

3.03 ADJUSTING AND CLEANING

- A. Adjust hardware for smooth operation.
- B. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building.

3.04 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Division 1.
- B. Do not permit adjacent work to damage hardware or finish.

3.05 SCHEDULE

Manufacturer List

<u>Code</u>	<u>Name</u>
BE	Best Access Systems
GL	Glynn Johnson
IV	Ives
LC	LCN Closers

**LO
NA
PE
RO
ST
VO
YA**

**Schlage Electronics
National Guard
Pemko
Rockwood
Stanley
Von Duprin
Yale**

SET #01

3	Hinges	BT FBB179 4 1/2 X 4 1/2	US32D	ST
1	Push Plate	8200 8 x 16	US32D-AM	IV
1	Pull Plate	8300 8 x 16	US32D-AM	IV
1	Door Pull	8102 HD 0	US32D-AM	IV
1	Auto Operator	4640	689	LC
2	Actuator	8310-816S	US32D	LC
2	Actuator Accessories	8310-867S / 8310-865		LC
1	Kick Plate	8400 10" x 34"	US32D	IV
1	Mop Plate	8400 6" x 34"	US32D	IV
1	Floorstop/Auto Holder	FS41 (field verify)	US26D	IV
3	Door Silencer	SR64		IV

SET #02

3	Hinges	BT FBB179 4 1/2 X 4 1/2	US32D	ST
1	Privacy Set	40H-0L-3	630AM	BE
1	Closer	4040 XP CUSH	US32D	LC
1	Kickplate	8400 10" x 34"	US32D	IV
1	Moplate	8400 6" x 34"	US32D	IV
1	Floorstop/Auto Holder	FS40 V.I.F.	US26D	IV
3	Door Silencer	SR64		IV

SET #03

3	Hinges	BT FBB179 4 1/2 X 4 1/2	US32D	ST
1	Push Plate	8200 8 x 16	US32D-AM	IV
1	Pull Plate	8300 8 x 16	US32D-AM	IV
1	Door Pull	8102 HD 0	US32D-AM	IV
1	Closer	4040 XP CUSH	US32D	LC
1	Kick Plate	8400 10" x 34"	US32D	IV
1	Mop Plate	8400 6" x 34"	US32D	IV
1	Floorstop/Auto Holder	FS41 (field verify).	US26D	IV
3	Door Silencer	SR64		IV

END OF SECTION

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SECTION 08 83 00

MIRROR GLASS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Glass mirrors.

1.02 PERFORMANCE REQUIREMENTS

- A. Limit mirrored glass deflection to 1/360 or flexure limit of glass with full recovery of glazing materials, whichever is less.

1.03 SUBMITTALS

- A. Product Data on Mirror Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- B. Manufacturer's Certificate: Certify that mirrors, meets or exceeds specified requirements.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual for glazing installation methods.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Do not install mirrors when ambient temperature is less than 50 degrees F.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Mirrors:
 1. Arch Aluminum & Glass Co., Inc: www.arch.amarlite.com.
 2. Binswanger Mirror/ACI Distribution: www.binswangermirror.com.
 3. Lenoir Mirror Co.: www.lenoirmirror.com.

2.02 MATERIALS

- A. Mirror Glass: Clear float type with copper and silver coating, organic overcoating, arised edges, 6 mm thick minimum.
 1. Sizes noted on Drawings.

2.03 GLAZING ACCESSORIES

- A. Mirror Attachment Accessories: Polished stainless steel, spring-loaded J-profile clips, top and bottom.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that openings for mirrored glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive mirrors.

3.02 INSTALLATION - GENERAL

- A. Install mirrors in accordance with NAMM recommendations.
- B. Set mirrors plumb and level, free of optical distortion.
- C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.
- D. Set mirrors with bottom edge of mirror surface is no higher than 40 inches above finished floor.

3.03 CLEANING

- A. Remove labels after Work is complete.
- B. Clean mirrors and adjacent surfaces.

END OF SECTION

SECTION 09 06 00

SCHEDULE FOR FINISHES

COLOR CODE	MATERIAL	LOCATION	DESCRIPTION
		For Reference Only See Drawing Finish Schedules for Specific Locations	
CT-1	Porcelain Tile	Restroom Floor Tile	<p>To Match: Distr: Mosaic Mfr.: Atlas Concorde Style: Mek, Matte Color: Medium Size: 12" x 24" Pattern: 1/3 Offset</p> <p>Setting Method: TCNA TR712-20 over tile & F205-17 over concrete slab on grade</p> <p>Grout To Match: Mfr.: Custom Building Products Product: CEG-Lite Epoxy Color: #165 Delorean Gray</p>
CT-2	Porcelain Tile	Restroom Floor Mosaic	<p>To Match: Distr: Mosaic Mfr.: Atlas Concorde Style: Mek, Matte Color: Medium Accent: 2" x 2" Mosaics</p> <p>Setting Method: TCNA TR712-20 over tile & F205-17 over masonry</p> <p>Grout To Match: Mfr.: Custom Building Products Product: CEG- Lite Epoxy Color: #165 Delorean Gray</p>

COLOR CODE	MATERIAL	LOCATION	DESCRIPTION
		For Reference Only See Drawing Finish Schedules for Specific Locations	
CT-3	Porcelain Tile	Restroom Wall Tile	<p>To Match: Distr: Mosaic Mfr.: Atlas Concorde Style: Reflex, Matte Color: Night Size: 24 " x 48"; (wall) 6" x 48" (base) Pattern: 1/3 Offset</p> <p>Setting Method: TCNA W202I-15 on masonry; W244C-15 on cement backer board</p> <p>Grout To Match: Mfr.: Custom Building Products Product: CEG- Lite Epoxy Color: #370 Dove Gray</p>
ST-1	Granite	Threshold	<p>To Match: Mfr.: Whole Tile Style: Hollywood Saddle Color: Black Granite, Honed</p>
PT-1	Paint	General Wall Color	<p>To Match: Mfr.: Sherwin Williams Color: Snowbound 7004 Sheen: Semigloss Type: Epoxy</p>
PT-2	Paint	General Ceiling Color	<p>To Match: Mfr.: Sherwin Williams Color: Extra White 7006 Sheen: Satin Type: Epoxy</p>
PT-3	Paint	General HM Frame Color Restroom Interiors	<p>To Match: Mfr.: Sherwin Williams Color: TBD Sheen: Semigloss Type: Latex</p>

COLOR CODE	MATERIAL	LOCATION	DESCRIPTION
		For Reference Only See Drawing Finish Schedules for Specific Locations	
PT-4	Paint	General HM Frame Color Public Corridor	To Match: Mfr.: Sherwin Williams Color: Match Existing Sheen: Semigloss Type: Latex
PT-5	Paint	General HM Frame Color Service Corridor	To Match: Mfr.: Sherwin Williams Color: Match Existing Sheen: Semigloss Type: Latex
PT-6	Paint	Service Corridor Walls Color	To Match: Mfr.: Sherwin Williams Color: Match Existing Sheen: Semigloss Type: Latex
PT-7	Paint	Office 136B Wall Color	To Match: Mfr.: Sherwin Williams Color: Match Existing Sheen: Semigloss Type: Latex
SS-1	Solid Surface Material	Lavatory Countertops	To Match: Mfr.: Wilsonart Color: Grey Beola, #9218CM

FACTORY FINISHED PRODUCT COLOR CODES			
TP-1	Toilet Partitions - HDPE	Toilets	To Match: Mfr.: ASI Global Partitions. Color: Charcoal, #9237

END OF SECTION

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SECTION 09 22 16

GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Metal stud wall framing, non-structural.
- B. Gypsum wallboard.
- C. Joint treatment.
- D. Framing accessories.

1.02 RELATED SECTIONS

- A. Section 06 10 00 – Rough Carpentry: Wood blocking for support of wall-mounted equipment.
- B. Section 07 21 00 – Thermal Insulation: Sound Attenuation Batt Insulation.
- C. Section 07 84 00 – Firestopping.
- D. Section 09 30 00 – Tile.

1.03 REFERENCES

- A. ASTM C 36/C 36M - Standard Specification for Gypsum Wallboard; 1999.
- B. ASTM C 79/C 79M - Standard Specification for Treated Core and Nontreated Core Gypsum Sheathing Board; 1997.
- C. ASTM C 442 - Standard Specification for Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board; 1999a.
- D. ASTM C 475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 1994.
- E. ASTM C 630/C 630M - Standard Specification for Water-Resistant Gypsum Backing Board; 1996a.
- F. ASTM C 1178 - Standard Specification for Coated Glass Mat Water Resistant Gypsum Backing Panel
- G. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members; 1999.
- H. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 1999a.

- I. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board; 1999.
- J. ASTM C 1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases; 1998.
- K. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 1999.
- L. ASTM E 413 - Classification for Rating Sound Insulation; 1987 (Reapproved 1999).
- M. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2000.
- N. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SYSTEM DESCRIPTION

- A. Acoustic Attenuation for Interior Partitions Indicated as Acoustic: STC of 50, or as indicated, calculated in accordance with ASTM E 413, based on tests conducted in accordance with ASTM E 90.

1.05 SUBMITTALS

- A. Product Data: Provide data indicating product characteristics, performance criteria, and limitations of use.

1.06 QUALITY ASSURANCE

- A. Perform in accordance with ASTM C 840.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated assemblies as indicated on drawings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum Board:
 - 1. G-P Gypsum Corporation; www.gp.com.
 - 2. National Gypsum Company; www.nationalgypsum.com.
 - 3. USG Corporation; www.usg.com.

2.02 METAL FRAMING MATERIALS

- A. Non-Loadbearing Framing Studs and Runners: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf. Systems to receive water resistant gypsum board or backer board: Maximum deflection of 1/360 of partition height. Interior suspended ceilings and soffits: Maximum deflection of 1/360 of distance between supports. Cavity shaftwall systems: Withstand minimum positive and negative pressure of 5 psf.
1. Studs: C shaped with knurled faces.
 2. Runners: U shaped, sized to match studs.
 3. Ceiling Channels: C shaped.
 4. Furring: Hat-shaped sections, minimum depth of 3/4 inch.
 5. Depth of sections: As indicated.
 6. Provide 25 gauge studs, except as otherwise indicated or specified. Provide heavier gauge if required.
 7. At door and borrowed light frames, provide (2) 25 gage minimum studs at each jamb. Where wall is indicated or specified to be typically framed with 20 gauge studs, provide (2) 20 gauge studs at each jamb.
 8. Provide 20 gauge studs at walls to receive cement backer board and water resistant gypsum board with ceramic tile facing.
 9. Depth of sections: As indicated.
 10. Corrosion protection: G40 hot-dipped galvanized coating per ASTM A525.
 11. Steel to contain a minimum 25% recycled content.
- B. Partition Head to Structure Connection: Provide mechanical anchorage devices that accommodate 1" downward and 1/2" upward deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
1. Structural Performance: Maintain lateral load resistance required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
 2. Products: Provide vertical deflection stud track system.
 - a. MaxTrak (SLT) by ClarkDietrich Building systems, or equal, as approved by UL for 1-hour and 2 –hour fire rated systems.

2.03 GYPSUM BOARD MATERIALS

- A. Standard Gypsum Wallboard: ASTM C 36/C 36M; sizes to minimize joints in place; ends square cut.
1. Thickness: As indicated.
 2. Edges: Tapered.

3. Facing paper and liner to be 100% recycled natural-finish paper.
- B. Ceiling Board: ASTM C 1396 (Section 12), non-sag type.
1. Thickness: ½ inch.
 2. Core: with additives to resist sagging.
- C. Fire Rated Gypsum Wallboard: ASTM C 36/C 36M; Type X or C to match required tested assemblies by UL, GA, or WH; sizes to minimize joints in place; ends square cut.
1. Thickness: As required to match tested fire rated assembly indicated.
 2. Edges: Tapered.
 3. Facing paper and liner to be 100% recycled natural-finish paper.
- D. Moisture and Mold Resistant Gypsum Backing Board: ASTM C 1396 (Section 5); regular type except where Type X fire-resistant type is indicated or required to meet UL assembly types.
1. Thickness: 1/2" inch.
 2. Edges: Tapered.

2.04 ACCESSORIES

- A. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board on all partitions with sound attenuation insulation.
- B. Corner Beads: Galvanized steel.
- C. Edge Trim: Bead type(s) as detailed.
- D. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
1. Ready-mixed vinyl-based joint compound.
 2. Joint Tape at glass-mat sheathing board: vapor-retardant foil tape.
- E. Screws: ASTM C 1002; self-drilling type; cadmium-plated for exterior locations.
- F. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

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: Fabricate and install systems according to manufacturer's instructions, but not less than that required to comply with ASTM C754.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 - 1. Level ceiling system to a tolerance of 1/1200.
- C. Studs: Space studs as indicated.
 - 1. Extend stud framing through ceiling to structure above only where indicated.
 - 2. Partitions Terminating at Structure: Attach top runner to structure. See drawings for minimum connection required. Maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Standard Wall Furring: Install at masonry or concrete 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.
 - 1. Orientation: Horizontal.
 - 2. Spacing: As indicated.
- F. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
- G. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, and hardware.

3.03 GYPSUM BOARD INSTALLATION

- A. Comply with ASTM C 840 and manufacturer's instructions. 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. Single-Layer Fire-Rated: Install gypsum board vertically, with edges and ends occurring over firm bearing.
- D. Gypsum Sheathing: Install horizontally, with edges butted tight and ends occurring over firm bearing.
- E. Installation on Metal Framing: Use screws for attachment of all gypsum board.

- F. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board with sealant.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls over 50 feet long.
 - 2. Where feasible, align control joint with one side of a door frame and extend from top of frame to above ceiling.
 - 3. In corridors, align control joints on both side walls with each other.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.05 JOINT TREATMENT

- A. Finish gypsum board in scheduled areas in accordance with levels defined in ASTM C 840 and as scheduled below.

3.06 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.07 FINISH LEVEL SCHEDULE

- A. Level 1: Above finished ceilings concealed from view.
- B. Level 2: Utility areas and areas behind cabinetry.
- C. Level 3: Walls scheduled to receive textured wall finish.
- D. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish.
- E. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish.

3.08 CLEANING

- A. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.

END OF SECTION

SECTION 09 31 00

CERAMIC TILE

- GENERAL

SECTION INCLUDES

- Tile for floor applications.
- Tile for wall applications.
- Backer board
- Stone thresholds.
- Accessory materials.
- Sealants for movement joints between tiles.
- Metal trim for exposed tile edges.

RELATED SECTIONS

- Division 01 Section Product Requirements for substitution procedures.
- Division 07 Section "Joint Sealants" for sealants used for expansion, contraction, control, and isolation joints in tile surfaces.
- Division 09 Section "Gypsum Board Assemblies".

SUBMITTALS

Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives. Data must indicate that products meet or exceed specified requirements.

- Samples to be provided only if the Basis of Design product is not used:
 - Mount floor tile and apply grout on plywood panel, minimum 24 x 24 inches in size.
 - Mount wall tile and apply grout on plywood panel, minimum 24 x 24 inches in size.

Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

QUALITY ASSURANCE

General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

Maintain one copy of TCNA 2015/2016 Handbook and ANSI A108 Series/A118 Series on site.

Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum 5 years of documented experience.

Installer Qualifications: Company specializing in performing tile installation, with minimum of 5 years of documented experience.

Installer shall be a five-star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors Association of America.

Installer shall employ Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as tile layers.

Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

Waterproof and crack isolation membranes.

Joint sealants.

Metal edge strips.

Mortar, patching compounds, primers, setting materials, adhesives, and grouts.

PERFORMANCE REQUIREMENTS

Static Coefficient of Friction (SCOF): For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

Level Surfaces: 0.87 wet; 0.70 dry.

Ceramic tile shall be as defined in, and shall conform to the requirements of, ANSI A137.1.

Dynamic Coefficient of Friction (DCOF): For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

Tiles suitable for level interior spaces expected to be walked upon when wet shall have a wet DCOF of 0.42, or greater, when tested using SLS [wetting agent] solution as per [BOT-3000E tribometer procedure].

Wet Pendulum Test Value (PTV): For tile installed on restroom and toilet walkway surfaces, provide products with the following values as determined by testing identical products per ASTM E303, Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester.

Tiles shall have a wet PTV of 0.35, or greater, when tested using a pendulum skid tester.

PRE-INSTALLATION MEETING

Convene one week before starting work of this section to review the Architect the tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, and setting details.

Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

DELIVERY, STORAGE, AND HANDLING

Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

ENVIRONMENTAL REQUIREMENTS

Do not install adhesives in an unventilated environment.

Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

EXTRA MATERIALS

Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

WARRANTY

Setting materials shall be provided by one of the manufacturers listed as part of a single source listed in this specification.

Products shall be provided with listed manufacturer as part of a two-year systems warranty.

Setting materials manufacturer, if requested, is to be present at Pre-construction meetings and or site inspections during installation.

PRODUCTS

TILE

Manufacturers: All products to match the Design Standard materials named in Section 09 06 00 - Schedule for Finishes.

Provide setting and grouting materials per the TCNA 2020 Handbook Method indicated in Section 09 06 00 - Schedule for Finishes, and in accordance with tile manufacturer's recommendations.

Provide tile materials to match the Design Standard materials named in Section 09 06 00 - Schedule for Finishes.

Basis of Design: **Atlas Concorde**

Other acceptable manufacturer's based on ability to match visual characteristics and technical performance of design standard:

Daltile.

Crossville.

Through-body colored, large format porcelain tile:
Comply with requirements in ANSI A326.3/A137.1-2017.
DCOF value: ≥ 0.42 in accordance with A137.1-2017 and ANSI A326.3.
Moisture absorption: $\geq 0.5\%$.
Breaking Strength: $0.42 > 500$ lbs.
MOH's: 8.5.
Chemical resistant.

TRIM AND ACCESSORIES

Thresholds: Granite, black, honed finish, Hollywood shape; 4 inches wide by full width of wall or frame opening; total thickness as required to match the adjoining floor level; beveled one long edge with radiused corners on top side; without holes, cracks, or open seams.

Applications: Provide at the following locations:

At doorways where tile terminates.

At open edges of floor tile where adjacent finish is a different height.

Metal Edge Trim: Anodized Aluminum Schluter QUADDEC Q 100 AE, or equal.

Locations:

Across top of wall base and wainscot.

All exposed inside and outside corners.

Include special shape end cap, in and out corners 90°.

Metal Cove Trim: Anodized Aluminum Schluter Base Trim DILEX-AHK 1S 100 AE, or equal.

Include special shape in corner 90° and out corner 135°.

SETTING MATERIALS

Over Concrete Floors: Medium Bed, Dry-Set Portland Cement Mortar for Large and Heavy Tile (LHT): Comply with requirements in ANSI A118.4 and Improved Modified Dry-Set Mortar ANSI 118.15. Provide product that is approved by manufacturer for application thickness of ½ inch minimum after tile is embedded.

Basis-of-Design Product: Subject to compliance with requirements, provide **Pro Lite Mortar** by Custom Building Products, or equal by one of the following:

Mapei Corp; Ultra Lite

Laticrete Int'l; 4XLT

Over Mosaic Tile Floors: Medium Bed, Dry-Set Portland Cement Mortar for Large and Heavy Tile (LHT): Comply with requirements in ANSI A118.4 and Improved Modified Dry-Set Mortar ANSI 118.15. Provide product that is approved by manufacturer for application thickness of ½ inch minimum after tile is embedded.

Basis-of-Design Product: Subject to compliance with requirements, provide **Pro Lite Premium Mortar** by Custom Building Products, or equal by one of the following:

Mapei Corp; Ultra Lite

Laticrete Int'l; 4XLT

Over Masonry Walls: Medium Bed, Dry-Set Portland Cement Mortar: Comply with requirements in ANSI A118.4 and ANSI 118.15. Provide product that is approved by manufacturer for application thickness of ½ inch minimum after tile is embedded.

Basis-of-Design Product: Subject to compliance with requirements, provide **Pro Lite LHT Mortar** by Custom Building Products, or equal by one of the following:

Mapei Corp; Ultra Lite
Laticrete Int'l; 4XLT

Over Tile Backer Board: Thin Set Latex-Portland Cement Mortar ANSI A118.4.

Basis-of-Design Product: Subject to compliance with requirements, provide **Versa Bond Professional Mortar** by Custom Building Products, or equal by one of the following:

Mapei Corp; Ultra Flex 2
Laticrete Int'l; 253 Gold

Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.

For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

GROUT MATERIALS

Epoxy Grout: ANSI A118.3. A two-component epoxy system that combines a pigmented hardener with epoxy resins and recycled aggregates.

Basis-of-Design Product: CEG-Lite 100% Solids Commercial Grade Epoxy Grout by Custom Building Products.

Other acceptable manufacturer's based on ability to match visual, technical and performance characteristics of design standard:

Mapei Corp.
Laticrete Int'l.

Refer to 09 06 00 - Schedule for Finishes for grout color.

ACCESSORY MATERIALS

Patching and Leveling Compounds for masonry walls and concrete floors: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

Basis-of-Design Products: Subject to compliance with requirements provide **Skim Coat & Patch** by Custom Building Products or equal by one of the following.

Mapei Corp.
Laticrete Int'l.

Cementitious Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced, long edges wrapped; and complying with ANSI A118.9 and ASTM C 1325.

Thickness: ½ in.

Width: 4 ft.

Length: 8 ft.

Edges: Tapered.

Compressive Strength: Not less than 2250 lbs. per sq. in. when tested in accordance with ASTM D 2394.

Water Absorption: Not greater than 8 percent when tested for 24 hours in accordance with ASTM C 473.

Joint Treatment: 2 inch wide coated glass fiber tape for joints and corners.

Fasteners: Drill point screws (No. 8) wafer head, corrosion-resistant, 1-1/4 inch or 1-5/8 inch long, and complying with ASTM C 1002.

Joint sealant: Use One Part Mildew Resistant Silicone Sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT, M, A, and O for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

Basis-of-Design Products: See Division 7 "Joint Sealants" for product specifications.

Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

Aqua Mix; Heavy Duty Grout and Tile Cleaner.

Primer: Single-component, water-based primer for improving adhesion to existing tile. Apply over existing tile after cleaning.

Crack Prevention Membrane: Liquid-applied, elastomeric membrane applied over primer. Tile Council of North America (TCNA) TCNA Handbook for Ceramic Tile Installation, TCNA Method EJ171, F125 & F125A

EXECUTION

EXAMINATION

Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

Verify that sub-floor surfaces are dust-free and free of substances which would impair bonding of setting materials to sub-floor surfaces.

Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

Verify that required floor-mounted utilities are in correct location.

PREPARATION

Protect surrounding work from damage.

Thoroughly clean existing tile and grout to be overlaid with new tile with heavy duty cleaner in accordance with cleaner manufacturer's instructions.

Thoroughly clean existing concrete slabs to receive new tile per ANSI A108.

New Slabs: If surface is unusually shiny due to excessive troweling, use mechanical scarification. If surface has any applied surface sealers or curing agents applied by others, use shot-blasting or bead blasting to remove.

Old Slabs: Use shot-blasting or bead blasting.

Use primer and crack prevention membrane over existing mosaic tile surfaces to receive new tile.

Use patching and self-leveling compound over concrete slabs to create a suitable, level surface to receive new tile. In areas with slope-to-drain floors, maintain slope-to-drain.

Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

Slab Cracks and Joints:

For slab cracks and joints less than 3/8 inch wide, span with membrane.

For slab cracks 3/8 inch wide or more, coordinate with General Contractor for installation of rigid joint filler.

For slab joints 3/8 inch wide or more, install expansion joint in tile aligning with slab joint.

Level existing substrate surfaces to acceptable flatness tolerances.

Prepare substrate surfaces for adhesive installation in accordance with setting material manufacturer's instructions.

INSTALLATION - GENERAL

Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCNA Handbook recommendations.

Discuss tile pattern with Architect before proceeding. Do not interrupt tile pattern through openings.

Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

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.

Jointing Pattern: Lay tile in pattern indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.

Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.

Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

Form internal angles square. External angles receive bullnose trim units.

Install thresholds where indicated.

Ensure a minimum of 90% contact between mortar and tile.

Back butter large format tiles having any dimension exceeding 15 inches with setting materials as described in Section 2.

Sound tile after setting. Replace hollow sounding units.

Keep control joints free of adhesive or grout. Apply sealant to joints.

Allow tile to set for a minimum of 48 hours prior to grouting.

Grout tile joints.

SEALANTS

Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

Apply sealants in all soft joints in assembly – EJ171.

EXPANSION JOINTS

Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, per latest TCNA EJ171-14. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

CLEANING

Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building.

On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

Remove epoxy and latex-portland cement grout residue from tile as soon as possible.

Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

PROTECTION OF FINISHED WORK

Cover all portions of completed floor tile with a minimum protective layer equivalent to ¼" inch tempered hardboard panel.

Do not permit foot or wheel traffic over finished floor surface for seven (7) days after installation.

END OF SECTION

SECTION 09 51 00

ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical Panels in suspension systems

1.02 RELATED WORK SPECIFIED UNDER OTHER SECTIONS

- A. Division 23 – HVAC Fans
- B. Division 26 – Electrical light fixtures.

1.03 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; 1998.

1.04 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years experience.

1.05 SUBMITTALS

- A. Product Data: Provide data indicating product characteristics, performance criteria, and limitations of use.
- B. Materials Recycled Content: Submit manufacturers' product data for indicating the percentage of post-industrial and post-consumer recycled content.

1.06 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.

1.07 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.
- C. Acoustic tile manufacturer is to coordinate wood furring substrate requirements with furring installer prior to purchase and installation of tiles.

1.08 EXTRA MATERIALS

- A. Provide 40 sq ft of each type of acoustical unit for Owner's use in maintenance of project.

1.09 WARRANTY

- A. Provide single source manufacturer's warranty for both suspensions system and tile for a period of 30 years from the date of substantial completion.

PART 2 - PRODUCTS

2.01 ACOUSTICAL UNITS

- A. Manufacturers:
 - 1. Armstrong World Industries, Inc; www.ceilings.com.
 - 2. Celotex Corporation.
 - 3. USG Interiors, Inc.; USG Corporation
- B. Acoustical Units
 - 1. Type: Wet-formed mineral fiber or fiberglass as indicated in Schedule.
 - 2. Surface Finish: Factory-applied vinyl latex paint, white, unless otherwise noted.
 - 3. Flame Spread/Fire Resistance: Class A: Flame Spread 25 or under (UL Labeled) per ASTM E 84.
 - 4. See Schedule for Types.

2.02 SUSPENSION SYSTEM(S)

- A. Manufacturers:
 - 1. Provide same manufacturer as for acoustical units.

- B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, and perimeter moldings as required.
- C. Exposed Steel Suspension System: Formed galvanized steel, commercial quality cold rolled, with painted finish; ASTM Class: Heavy Duty.
 - 1. Profile: Tee; 15/16 inch wide face, 11/16 inch tall web height.
 - 2. Construction: Double web, Rotary Stitched, Peakform bulb profile on main beams.
 - 3. Product: See Schedule for Types.

2.03 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, 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.
 - 2. Provide longest possible length and minimize splicing.
- C. Hangar Wire: Minimum 12 gauge.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.
- C. Verify that ceiling height indicated will clear the existing window head frames.
- D. Verify that above ceiling items of work will fit within the space allocated before installation of ceiling grid.

3.02 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.
 - 1. Tie both ends of wire by wrapping around itself a minimum of three (3) complete 360 degree tight turns.
 - 2. Install support hanger wire is that it is taut.
 - 3. Install as required by manufacturer to meet seismic performance criteria indicated on documents.

- 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. Where patching, repairing, or attaching to existing ceilings match existing grid layout.
- E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- F. 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.
- G. 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.
- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- J. Do not eccentrically load system or induce rotation of runners.
- K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths and minimize splicing.
 - 2. Miter corners.
 - 3. Meet local building code criteria for seismic loading.
 - 4. Maintain levelness throughout.

3.03 INSTALLATION - ACOUSTICAL PANELS

- A. Install acoustical panels in accordance with manufacturer's instructions.
- B. Fit acoustical panels 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. Install acoustical panels in a level, uniform plane, free from twist, warp, and dents.
- E. Cutting acoustical panels:
 - 1. Cut to fit irregular grid and perimeter edge trim.
 - 2. Make field cut edges of same profile as factory edges.

3.04 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.

3.05 CLEANING

- A. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building once the building has been dried-in.

3.06 SCHEDULE

- A. Type 1 - Suspended: Armstrong Ceramaguard Fine Fissured #607; 24" x 24" x 5/8"; NRC: 0.55 minimum; CAC 35 minimum; LR: 80 % minimum; Pre-Consumer Recycled content: 35% minimum, or approved equal. Grid: Prelude Plus XL 15/16", white finish, by Armstrong, or approved equal by listed manufacturer.

END OF SECTION

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SECTION 09 90 00

PAINTS AND COATINGS

1.1 REFERENCES

- A. Steel Structures Painting Council (SSPC):
 - 1. SSPC-SP 1 - Solvent Cleaning.
 - 2. SSPC-SP 2 - Hand Tool Cleaning.
 - 3. SSPC-SP 3 - Power Tool Cleaning.
 - 4. SSPC-SP7/NACE No. 4, Brush-Off Blast Cleaning.
 - 5. SSPC-SP10/NACE No. 2, Near-White Blast Cleaning.
 - 6. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete.
- B. Material Safety Data Sheets / Environmental Data Sheets: Per manufacturer's MSDS/EDS for specific VOCs (calculated per 40 CFR 59.406). VOCs may vary by base and sheen.

1.2 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: For each paint system indicated, including.
 - 1. Product characteristics.
 - 2. Surface preparation instructions and recommendations.
 - 3. Primer requirements and finish specification.
 - 4. Storage and handling requirements and recommendations.
 - 5. Application methods.
 - 6. Cautions for storage, handling and installation.
- C. Verification Samples: For each finish product specified, submit samples that represent actual product, color, and sheen.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish surfaces for verification of products, colors and sheens.
 - 2. Finish area designated by Architect.
 - 3. Provide samples that designate primer and finish coats.
 - 4. Do not proceed with remaining work until the Architect approves the mock-up.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information.
 - 1. Product name, and type (description).
 - 2. Application and use instructions.
 - 3. Surface preparation.
 - 4. VOC content.
 - 5. Environmental handling.
 - 6. Batch date.
 - 7. Color number.
- B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
- C. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.
- D. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

1.5 PROJECT CONDITIONS

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

1.6 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
- B. Furnish Owner with an additional one percent of each material and color, but not less than 1 gal (3.8 l) or 1 case, as appropriate.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers
 - 1. The Sherwin-Williams Company (Basis of Design)
 - 2. PPG Paints
 - 3. Benjamin Moore

2.2 APPLICATIONS/SCOPE

- A. Interior Paints and Coatings:
 - 1. Concrete: Poured, precast, tilt-up, cast-in-place, cement board, plaster.
 - 2. Masonry: Concrete masonry units, including split-face, scored, and smooth block.
 - 3. Metal: Aluminum, galvanized steel.
 - 10. .

2.3 PAINT MATERIALS - GENERAL

- A. Paints and Coatings:
 - 1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
 - 2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color. Or follow manufacturer's product instructions for optimal color conformance.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Coating Application Accessories: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.
- D. Color: Refer to Finish Schedule for paint colors, and as selected.

2.4 INTERIOR PAINT SYSTEMS

- A. CONCRETE - Walls and Ceilings, Poured Concrete, Precast Concrete, Unglazed Brick, Cement Board, Tilt-Up, Cast-In-Place including Plaster Walls and Ceilings.
 - 1. Epoxy Systems (Water Based):
 - a. Semi-Gloss Finish:
 - 1) 1st Coat: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300 (8 mils wet, 3.2 mils dry).
 - 2) 2nd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46- Series.
 - 3) 3rd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46- Series (4 mils wet, 1.5 mils dry per coat).
- B. MASONRY: CMU - Concrete, Split Face, Scored, Smooth, High Density, Low Density, Fluted.
 - 1. Latex Systems:
 - a. Semi-Gloss Finish High Performance:
 - 1) 1st Coat: S-W PrepRite Block Filler, B25W25 (75-125 sq ft/gal).
 - 2) 2nd Coat: S-W Pro Industrial Semi-Gloss Acrylic Coating, B66-650 Series.
 - 3) 3rd Coat: S-W Pro Industrial Semi-Gloss Acrylic Coating, B66-650 Series (6.0 mils wet, 2.5 mils dry per coat).
 - 2. Epoxy Systems (Water Based) (Wet Areas, Restrooms, Showers, Wash Areas):
 - a. Gloss Finish:
 - 1) 1st Coat: S-W Loxon Block Surfacer, A24W200 (50-100 sq ft/gal).
 - 2) 2nd Coat: S-W Pro Industrial Water Based Catalyzed Epoxy, B73-300 Series.

- 3) 3rd Coat: S-W Pro Industrial Water Based Catalyzed Epoxy, B73-300 Series (5.0 mils wet, 2.0 mils dry per coat).
- C. METAL: Ferrous, Galvanized, Hollow Metal Doors & Frames
1. Alkyd Systems (Water based):
 - a. Semi-Gloss Finish:
 - 1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils wet, 2.0 mils dry).
 - 2) 2nd Coat: S-W Industrial Water Based Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series.
 - 3) 3rd Coat: S-W Industrial Water Based Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series (4.0-5.0 mils wet, 1.4 - 1.7 mils dry per coat).
- D. WOOD - (Walls, Ceilings, Doors, Trim):
1. Alkyd Systems (Water based):
 - a. Semi-Gloss Finish:
 - 1) 1st Coat: S-W Premium Wall and Wood Primer, B28W8111 (4 mils wet, 1.8 mils dry).
 - 2) 2nd Coat: S-W ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B34-8200 Series.
 - 3) 3rd Coat: S-W ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss, B34-8200 Series (4 mils wet, 1.7 mils dry per coat).
- E. DRYWALL - (Walls, Ceilings, Gypsum Board and similar items)
1. Latex Systems:
 - a. Semi-Gloss Finish:
 - 1) 1st Coat: S-W ProMar200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
 - 2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series.
 - 3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series (4 mils wet, 1.6 mils dry per coat).
 - b. Eg-Shel / Satin Finish:
 - 1) 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
 - 2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series.
 - 3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series (4 mils wet, 1.7 mils dry per coat).
 - c. Low Sheen Finish:
 - 1) 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
 - 2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series.
 - 3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series (4 mils wet, 1.6 mils dry per coat).
 - d. Flat Finish:
 - 1) 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
 - 2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Flat, B30-2600

Series.

- 3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series (4 mils wet, 1.6 mils dry per coat).

2. **Epoxy Systems for Toilet Rooms:**

a. Semi-Gloss Finish:

- 1) 1st Coat: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry
- 2) 2nd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46W00151-20 Series. (1.5 mils dry per coat).
- 3) 3rd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46W00151-20 Series. (1.5 mils dry per coat).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared; notify Architect of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- B. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.
- C. Previously Painted Surfaces: Verify that existing painted surfaces do not contain lead based paints, notify Architect immediately if lead based paints are encountered.

3.2 SURFACE PREPARATION

- A. General: Surfaces shall be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
 1. Prior to attempting to remove mildew, it is recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions are advised.
 2. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow the surface to dry before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
 3. Remove items including but not limited to thermostats, electrical outlets, switch covers and similar items prior to painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
 4. No exterior painting should be done immediately after a rain, during foggy

weather, when rain is predicted, or when the temperature is below 50 degrees F (10 degrees C), unless products are designed specifically for these conditions. On large expanses of metal siding, the air, surface and material temperatures must be 50 degrees F (10 degrees F) or higher to use low temperature products.

- B. Block (Cinder and Concrete): Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75 degrees F (24 degrees C). The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.
- C. Concrete, SSPC-SP13 or NACE 6: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.
- D. Cement Composition Siding/Panels: Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Pressure clean, if needed, with a minimum of 2100 psi pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. The pH of the surface should be between 6 and 9, unless the products are designed to be used in high pH environments.
- E. Copper and Stainless Steel: Remove all oil, grease, dirt, oxide and other foreign material by Exterior Composition Board (Hardboard): Some composition boards may exude a waxy material that must be removed with a solvent prior to coating. Whether factory primed or unprimed, exterior composition board siding (hardboard) must be cleaned thoroughly and primed with an alkyd primer.
- F. Drywall - Exterior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting. Exterior surfaces must be spackled with exterior grade compounds. BARE DRYWALL MUST BE PRIMED WITH 2 TOPCOATS FOR CONSISTENT FINISH.
- G. Drywall - Interior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting. BARE DRYWALL MUST BE PRIMED WITH 2 TOPCOATS FOR CONSISTENT FINISH.
- H. Galvanized Metal: Clean per SSPC-SP1 using detergent and water or a degreasing

cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP16 is necessary to remove these treatments.

- I. Steel: Structural, Plate, And Similar Items: Should be cleaned by one or more of the surface preparations described below. These methods are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Society of Protective Coatings. A brief description of these standards together with numbers by which they can be specified follow.
 1. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
 2. Hand Tool Cleaning, SSPC-SP2: Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
 3. Power Tool Cleaning, SSPC-SP3: Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
 4. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4: A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
 5. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
 6. Water Blasting, SSPC-SP12/NACE No. 5: Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.
- J. Wood: Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

3.3 INSTALLATION

- A. Apply all coatings and materials with the manufacturer's specifications in mind. Mix and thin coatings according to manufacturer's recommendations.
- B. Do not apply to wet or damp surfaces. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days. Test new concrete for moisture content. Wait until wood is fully dry after rain or morning fog or dew.
- C. Apply coatings using methods recommended by manufacturer.
- D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.
- E. Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.
- F. Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.
- G. Inspection: The coated surface must be inspected and approved by the Architect just prior to the application of each coat.

3.4 PROTECTION

- A. Protect finished coatings from damage until completion of project.
- B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

END OF SECTION

SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic Toilet Compartments.
- B. Solid plastic Urinal Screens.

1.02 SUBMITTALS

- A. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- B. Product Data: Provide data on panel construction, hardware, and accessories.
- C. Samples: Submit two samples of partition panels, 2 x 2 inch in size illustrating panel finish, color, and sheen.

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. Basis of Design: ASI Global Partitions, Inc.: www.globalpartitions.com.
 - 2. Other acceptable manufacturer's based on ability to match visual characteristics of design standards:
 - a) Scranton Products Co., Inc: www.scrantonproducts.comOshkosh.
 - b) Ampco Products, Inc.: www.ampco.com.Scranton Products Co., Inc: www.scrantonproducts.com.

2.02 COMPONENTS

- A. Toilet Compartments: Solid, homogenous, molded high-density Polyethylene (HDPE) plastic panels, doors, and pilasters, floor-mounted, headrail-braced.
 - 1. Rating: Class "B" Fire Rated per ASTM E 84.
 - 2. Material shall be compliant with IBC 2012 or later and must be solid HDPE;

foamed material is not allowed. Material shall be NFPA 286 compliant.

3. Edges: 1/4 inch (6 mm) radius machined edges
 4. Color: To match Design Standard indicated in 09 06 00 Schedule for Finishes.
 5. Finish: Pebble-textured homogenous color throughout material.
 6. Door and Panel Dimensions:
 - a. Thickness: 1 inch.
 - b. Door Width: 24 inch.
 - c. Door Width for Handicapped Use: 36 inch.
 - d. Height: 55 inch.
 - e. Height Above Floor: 14 inch
 7. Pilasters Dimensions:
 - a. Height: 82 inch.
 - b. Thickness of Pilasters: 1 inch.
 - c. Overhead rail braced.
- B. Urinal Screens: Solid, homogenous, molded high-density Polyethylene (HDPE) plastic panels and pilasters, wall-mounted.
1. Urinal Screen Dimensions:
 - a. Thickness: 1 inch.
 - b. Screen Width: 24 inch.
 - c. Height: 58 inch.
 - d. Height Above Floor: 12 inch.

2.03 ACCESSORIES

- A. Pilaster Shoes: Formed Type 304 stainless steel with No. 4 satin finish, 3 inch high, concealing floor fastenings.
 1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Toilet Compartment Head Rails: Extruded, satin-finished anodized aluminum, 1 x 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.
- C. Pilaster Brackets: Continuous/Full-height type, polished stainless steel. Pilaster shoes are anchored to the pilaster with No. 10 stainless steel, vandal-resistant screws.
- D. Wall Brackets: Continuous/full-height, double ear or "H" type, anodized extruded aluminum (6063-T5 alloy) wall brackets, pre-drilled.
- E. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.

- F. Hardware:
1. Heavy-duty 8" extruded aluminum hinge with gravity-acting cam.
 - a. Slide latch, strike/keeper and hinges to be through bolted onto doors and pilasters using stainless steel, vandal-resistant through bolts.
 - b. Keeper to allow for emergency access into the stall by lifting up on the bottom of the door.
 - c. All doors to swing closed under their own weight.
 2. Door Latch: Anodized extruded aluminum, Slide type with exterior emergency access feature.
 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 out-swinging doors.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- 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. Attach 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.

3.03 ERECTION TOLERANCES

- A. Maximum Variation from True Position: 1/4 inch.
- B. Maximum Variation from Plumb: 1/8 inch.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position in-swinging doors in partial opening position when unlatched.
- C. Adjust hinges of out-swinging doors to return to a fully closed position.
- D. Adjust adjacent components for consistency of line or plane.

END OF SECTION

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SECTION 10 28 13

TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Accessories for toilet rooms
- B. Grab bars.
- C. Owner-provided / Contractor installed accessories.

1.02 RELATED WORK

- A. Owner Preferred Brands - Division 1.
- B. Rough Carpentry - Division 6.

1.03 REFERENCES

- A. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 1997a.
- B. ASTM A 269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 1998.
- C. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 1999.

1.04 SUBMITTALS

- A. Product Data: Provide data on accessories describing quantity, size, finish, details of function, attachment methods.

1.05 COORDINATION

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.
- B. Coordinate timely receipt of Owner-provided accessories for Contractor installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Products listed indicate Owner Preferred Brand Products.
- B. Other Acceptable Manufacturers:
 - 1. American Specialties, Inc: www.americanspecialties.com.
 - 2. Bradley Corporation: www.bradleycorp.com.
 - 3. Bobrick Washroom Equipment: www.bobrick.com.

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. Stainless Steel Sheet: ASTM A 666, Type 304.
- C. Stainless Steel Tubing: ASTM A 269, Type 304 or 316.
- D. Adhesive: Two component epoxy type, waterproof.
- E. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof, security type.
- F. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

- A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.
- B. Galvanizing for Items other than Sheet: ASTM A 123/A 123M to 1.3 oz/sq yd. Galvanize ferrous metal and fastening devices.

2.04 TOILET ROOM ACCESSORIES – OWNER PROVIDED / CONTRACTOR INSTALLED

- A. Toilet Paper Dispenser: Double roll – One Jumbo and one stub roll size, surface mounted with smoked transparent cover and grey body.
 - 1. Cored JRT Combo Unit, Model: #09551 by Kimberly Clark Professional, or equal.
- B. Soap Dispenser: Liquid soap dispenser, Battery-operated Hands-free, wall surface-mounted.

1. FMX_12 1250 ML Dispenser, Model: # 5150-06 with backplate Model # 5250-06 by GOJO, or equal.
 - C. Paper Towel Dispenser: Hands-free, surface mounted. One Jumbo roll size, surface mounted with smoked transparent cover and grey body.
 1. Model #9990 by Kimberly Clark/Scott, or equal.
 - D. Waste Receptacle: Free-standing receptacle.
 - E. Compost Bin: Free-standing bin.
- 2.05 TOILET ROOM ACCESSORIES – CONTRACTOR PROVIDED / CONTRACTOR INSTALLED
- A. Baby-Changing Station: Wall-mounted, horizontal design, polypropylene with gas spring mechanism, dual-liner cavity with lock, child protection straps and bag hooks, Braille label, instructional graphics and sanitary bed liner dispenser.
 1. Model #KB2000 by Koala Kare Products, or equal.
 - B. Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, nonslip, peened grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar. Must meet ADA accessibility guidelines.
 1. Length and configuration: As indicated on drawings.
 2. Model B-5806-99 Series by Bobrick, or equal.
 - C. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing cover with full-length stainless steel piano-type hinge.
 1. Model B-270 by Bobrick Contura Series, or equal.
 - D. Sanitary Napkin Dispenser: Stainless steel, surface-mounted, locking front panel with full-length stainless steel piano-type hinge.
 1. Model B-2800 by Bobrick, or equal.
 2. Operation: 25 cents.
 - E. Full-Length Mirror: 1/4-inch float glass mirror with welded stainless steel perimeter frame, surface-mounted.
 1. Model B-290 2460 by Bobrick, or equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. See Section 06 10 00 for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Receive Owner-provided accessories and securely store until ready for installation.

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, or as indicated on drawings.

3.04 CLEANING

- A. Coordinate cleaning program with General Contractor. No cleaning products or solvents containing volatile organic compound (VOC's) are permitted within the building.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Pipe labels.
 - 3. Valve tags.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick.
 - 2. Letter Color: White.
 - 3. Background Color: Black.
 - 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules).
 - C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.02 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 2. Lettering Size: At least 1-1/2 inches.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.02 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.03 PIPE LABEL INSTALLATION

- A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

- B. Pipe Label Color Schedule:
 - 1. Cold Water Piping:
 - a. Background Color: Green.
 - b. Letter Color: White.
 - 2. Hot Water Piping:
 - a. Background Color: Green.
 - b. Letter Color: White.

3.04 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape:
 - a. Cold Water: 1-1/2 inches, round.
 - b. Hot Water: 1-1/2 inches, round
 - 2. Valve-Tag Color:
 - a. Cold Water: Natural.
 - b. Hot Water: Natural
 - 3. Letter Color:
 - a. Cold Water: Black.

b. Hot Water: Black

END OF SECTION

SECTION 22 07 19

PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes insulating the following plumbing piping services:
 - 1. Domestic cold-water piping.
 - 2. Domestic hot-water piping.
 - 3. Domestic recirculating hot-water piping.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).
- B. Shop Drawings:
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - 3. Detail removable insulation at piping specialties, equipment connections, and access panels.
 - 4. Detail application of field-applied jackets.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

- C. Comply with the following applicable standards and other requirements specified for miscellaneous components:

- 1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.06 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields.
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.07 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS

- A. If retaining more than one type of insulation in this article, indicate where each type applies in insulation system schedules.
- B. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- C. See "Product Characteristics" Article in Evaluations for comparisons and temperature ranges for insulation material properties.
- D. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- E. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- F. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

- G. Mineral-Fiber, Preformed Pipe Insulation:
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Johns Manville; Micro-Lok.
 - b. Knauf Insulation; 1000-Degree Pipe Insulation.
 - c. Owens Corning; Fiberglas Pipe Insulation.
 - d. Or approved equal.
 2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- H. PVC Jacket Adhesive: Compatible with PVC jacket.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 739, Dow Silicone.
 - b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 - c. P.I.C. Plastics, Inc.; Welding Adhesive.
 - d. Speedline Corporation; Polyco VP Adhesive.
 - e. Or approved equal.

2.02 SEALANTS

- A. ASJ Jacket, and PVC Jacket Flashing Sealants:
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
 - b. Or approved equal.
 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 3. Fire- and water-resistant, flexible, elastomeric sealant.
 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 5. Color: White.

2.03 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.04 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
 - e. Or approved equal.
 2. Adhesive: As recommended by jacket material manufacturer.
 3. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.05 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 428 AWF ASJ.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
 - c. Compac Corporation; 104 and 105.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 - e. Or approved equal.
 2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 370 White PVC tape.
 - b. Compac Corporation; 130.
 - c. Venture Tape; 1506 CW NS.
 - d. Or approved equal.
 2. Width: 2 inches.

3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

2.06 PROTECTIVE SHIELDING GUARDS

- A. Protective Shielding Piping Enclosures. :
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Truebro; a brand of IPS Corporation.
 - b. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.
 - c. Or approved equal.
 2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
1. Verify that systems to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Tape seams and joints with products recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier sealant.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- J. Apply adhesives, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 3. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- O. For above-ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Cleanouts.

3.04 PENETRATIONS

- A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

3.05 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 - 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and

irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.06 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
1. Secure preformed pipe insulation to pipe with self-sealing strips and tape without deforming insulation materials.
 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier tape or sealant.
 3. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier flashing sealant.
- B. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
 2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Cover insulation materials with preformed PVC jacket.
- C. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.

2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.07 FIELD-APPLIED JACKET INSTALLATION

- A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturers recommended adhesive.
 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.08 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 1. Drainage piping located in crawl spaces.
 2. Underground piping.
 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.09 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold Water:
 1. All sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- B. Domestic Hot Water:
 1. NPS 1-1/4 and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 2. NPS 1-1/2 and Larger: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 thick.

END OF SECTION

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SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Aboveground domestic water pipes, tubes, and fittings inside buildings.

1.03 ACTION SUBMITTALS

- A. Product Data: For transition fittings and dielectric fittings.

1.04 FIELD CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of water service.
 - 2. Do not interrupt water service without Owner's written permission.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14 and NSF 61.

2.02 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

- B. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
- C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- D. Copper Unions:
 - 1. MSS SP-123.
 - 2. Cast-copper-alloy, hexagonal-stock body.
 - 3. Ball-and-socket, metal-to-metal seating surfaces.
 - 4. Solder-joint.

2.03 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials:
 - 1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
 - 2. Full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys.
- D. Flux: ASTM B 813, water flushable.
- E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

PART 3 - EXECUTION

3.01 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install isolation valves on both hot and cold water pipes supplying each restroom.
- C. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.
- D. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- G. Install piping to permit valve servicing.
- H. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- L. Install sleeve seals for piping penetrations of concrete walls and slabs.
- M. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.02 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
- D. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- E. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- F. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.03 HANGER AND SUPPORT INSTALLATION

- A. Support vertical piping and tubing at base and at each floor.

- B. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- C. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
- D. Install supports for vertical copper tubing every 10 feet.
- E. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.04 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
 - 1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - 2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
 - 3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.05 IDENTIFICATION

- A. Identify system components using pipe markers on pipe runs, and plastic tags for equipment, and specialties.

3.06 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Piping Inspections:
 - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.

- b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
 - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
- c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
- d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

- a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
- b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
- c. Chemically disinfect all new piping per University standards.
- d. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
- e. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
- f. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
- g. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports, and submit to Owner.

3.07 ADJUSTING

A. Perform the following adjustments before operation:

- 1. Close drain valves, hydrants, and hose bibbs.
- 2. Open shutoff valves to fully open position.
- 3. Open throttling valves to proper setting.
- 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

- a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
 6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
 8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.08 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Repeat procedures if biological examination shows contamination.
 - e. Submit water samples in sterile bottles to authorities having jurisdiction.
- B. Clean non-potable domestic water piping as follows:
 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

- C. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.
- D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.09 PIPING SCHEDULE

- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
- C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.
- D. Aboveground domestic water piping, NPS 1-1/4 and larger, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.
- E. Aboveground domestic water piping, NPS 1 and smaller, shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L; wrought-copper, solder-joint fittings; and soldered joints.

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SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Pipe, tube, and fittings.

1.03 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.05 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.06 PROJECT CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Architect no fewer than two days in advance of proposed interruption of sanitary waste service.
 - 2. Do not proceed with interruption of sanitary waste service without Architect's written permission.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe Arcadis.

2.02 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Heavy-Duty, Hubless-Piping Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ANACO-Husky.
 - b. Clamp-All Corp.
 - c. Dallas Specialty & Mfg. Co.
 - d. MIFAB, Inc.
 - e. Mission Rubber Company; a division of MCP Industries, Inc.
 - f. Stant.
 - g. Tyler Pipe.
 - 2. Standards: ASTM C 1277 and ASTM C 1540.
 - 3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
- C. Cast-Iron, Hubless-Piping Couplings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. MG Piping Products Company.
 - 2. Standard: ASTM C 1277.
 - 3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.03 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service and Extra Heavy classes.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.04 GALVANIZED-STEEL PIPE AND FITTINGS

- A. Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Standard Weight class. Include square-cut-grooved or threaded ends matching joining method.

PART 3 - EXECUTION

3.01 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different Arcadis are connected. Reducing size of drainage piping in direction of flow is prohibited.
- K. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- L. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.

- 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- O. Retain first paragraph below for piping that penetrates an exterior concrete wall or concrete slab.
- P. Install sleeve seals for piping penetrations of concrete walls and slabs.
- Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.
- R. Install all vertical riser cleanouts at level that is above water closet rim level.

3.02 JOINT CONSTRUCTION

- A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum calked joints.
- C. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

3.03 SPECIALTY PIPE FITTING INSTALLATION

- A. Dielectric Fittings:
 - 1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.04 HANGER AND SUPPORT INSTALLATION

- A. Comply with the following requirements for pipe hanger and support devices and installation.
 - 1. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 - b. NPS 3: 60 inches with 1/2-inch rod.
 - c. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 - 2. Install supports for vertical cast-iron soil piping every 15 feet.
 - 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
- B. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.05 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage piping in Arcadis indicated, but not smaller than required by plumbing code.
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in Arcadis indicated, but not smaller than required by authorities having jurisdiction.
 - 3. Plumbing Specialties: Connect drainage and vent piping in Arcadis indicated, but not smaller than required by plumbing code.
 - 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
 - 5. Cleanouts and drains
 - 6. Equipment: Connect drainage piping as indicated.

3.06 TESTING

- A. Pressure test system per University standards.
- B. Document test results to engineer and Owner.

3.07 IDENTIFICATION

- A. Identify exposed sanitary waste and vent piping.

3.08 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.09 PIPING SCHEDULE

- A. Aboveground waste and vent piping, which is not located in a return air plenum space shall be the following:
 - 1. Hubless, cast-iron soil pipe and fittings; heavy-duty, hubless-piping couplings; and coupled joints.
- B. Aboveground, waste and vent piping, which is to be located in a space that serves as a return air plenum for the air conditioning system shall be the following:
 - 1. Hubless, cast-iron soil pipe and fittings; heavy-duty, hubless-piping couplings; and coupled joints.
- C. Fixture arms shall be the following:

1. Sch. 40 galvanized steel pipe with heavy-duty, hubless-piping couplings; and coupled joints.

END OF SECTION

SECTION 22 13 19

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Cleanouts.
 - 2. Floor drains.
 - 3. Air-admittance valves.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

PART 2 - PRODUCTS

2.01 CLEANOUTS

- A. Floor Cleanouts:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Zurn Plumbing Products Group; Light Commercial Operation.
 - b. Josam Company; Josam Div.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Watts Drainage Products Inc.
 - 2. Size: Same as connected branch.
 - 3. Type: Adjustable housing.

4. Body: Cast iron.
5. Closure Plug: Bronze plug.
6. Riser: Drainage pipe fitting and riser to cleanout of same material as drainage piping.
7. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
8. Frame and Cover Shape: Round

2.02 FLOOR DRAINS

A. Cast-Iron Floor Drains (FD-1 & FD-2):

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. MIFAB
 - b. Josam Company; Josam Div.
 - c. Zurn Plumbing Products Group; Light Commercial Operation.
 - d. Or equal.
2. Standard: ASME A112.6.3.
3. Material: Cast iron.
4. Seepage Flange: Required.
5. Clamping Device: Required.
6. Outlet: Bottom.
7. Sediment Bucket: Not required.
8. Top or Strainer Material: Bronze.
9. Top of Body and Strainer Finish: Nickel bronze.
10. Top Shape: Round.
11. Trap Material: Cast iron.
12. Trap Pattern: Standard P-trap.
13. Trap Features: Trap-seal primer valve drain connection.

2.03 AIR-ADMITTANCE VALVES

A. Fixture Air-Admittance Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ayrlett, LLC.
 - b. Durgo, Inc.
 - c. Oatey.
 - d. ProSet Systems Inc.
 - e. RectorSeal.
 - f. Studor, Inc.

2. Standard: ASSE 1051, Type A for single fixture or Type B for branch piping.
3. Housing: Plastic.
4. Operation: Mechanical sealing diaphragm.
5. Size: Same as connected fixture or branch vent piping.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 2. Locate at each change in direction of piping greater than 45 degrees.
 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 4. Locate at base of each vertical soil and waste stack.
- B. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- C. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- D. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 1. Position floor drains for easy access and maintenance, unless indicated on Architect's plans.
 2. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 3. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

3.02 CONNECTIONS

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

3.03 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 13 19

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SECTION 22 42 13.13

COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Water closets.
 - 2. Flushometer valves.
 - 3. Toilet seats.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

PART 2 - PRODUCTS

2.01 WALL-MOUNTED WATER CLOSETS

- A. Water Closets (P-1): Wall hung, top spud.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following:
 - a. American Standard
 - b. Crane Plumbing, L.L.C.
 - c. Gerber Plumbing Fixtures LLC.
 - d. Kohler Co.
 - e. TOTO USA, INC.
 - 2. Bowl:
 - a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
 - b. Material: Vitreous china.
 - c. Type: Siphon jet.
 - d. Style: Automatic flushometer valve with remote sensor and manual flush override.
 - e. Height: Standard.

- f. Rim Contour: Elongated.
 - g. Water Consumption: 1.28 gal. Per flush.
 - h. Spud Size and Location: NPS 1-1/2; top.
 - i. Color: White.
3. Bowl-to-Drain Connecting Fitting: ASTM A 1045 or ASME A112.4.3.
 4. Flushometer Valve (P-1): As specified herein.
 5. Toilet Seat (P-1): As specified herein.

B. Water Closets (P-2): Wall mounted, top spud, ADA compliant.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following:
 - a. American Standard
 - b. Crane Plumbing, L.L.C.
 - c. Gerber Plumbing Fixtures LLC.
 - d. TOTO USA, INC.
 - e. Or approved equal.
2. Bowl:
 - a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
 - b. Material: Vitreous china.
 - c. Type: Siphon jet.
 - d. Style: Automatic flushometer valve with remote sensor and manual flush override.
 - e. Height: Handicapped/elderly, complying with ICC/ANSI A117.1.
 - f. Rim Contour: Elongated.
 - g. Water Consumption: 1.28 gal. Per flush.
 - h. Spud Size and Location: NPS 1-1/2; top.
 - i. Color: White.
3. Bowl-to-Drain Connecting Fitting: ASTM A 1045 or ASME A112.4.3.
4. Flushometer Valve (P-2): As specified herein.
5. Toilet Seat (P-2): As specified herein.

2.02 FLUSHOMETER VALVES

1. Solenoid-Actuator, Diaphragm Flushometer Valves:
 - a. Standard: ASSE 1037.
 - b. Minimum Pressure Rating: 125 psig.
 - c. Features: Include integral check stop and backflow-prevention device.
 - d. Material: Brass body with corrosion-resistant components.
 - e. Exposed Flushometer-Valve Finish: Chrome plate.
 - f. Panel Finish: Chrome plated or stainless steel.
 - g. Style: Concealed.
 - h. Actuator: Solenoid complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 1) Trip Mechanism: Hard-wired electronic sensor complying with UL 1951, and listed and labeled as defined in NFPA 70, by a

qualified testing agency, and marked for intended location and application.

- 2) Consumption: 1.28 gal. per flush.
- 3) Minimum Inlet: NPS 1.
- 4) Minimum Outlet: NPS 1-1/4.
- 5) Power supply: Provide 120V power supply adapters with output voltage suitable for devices. Provide the quantity and required grouping required for wiring devices in each room.

2.03 TOILET SEATS

A. Toilet Seats (P-1 & P-2):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bemis Manufacturing Company.
 - b. Church Seats.
 - c. Olsonite Seat Co.
 - d. Or approved equal.
2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.
4. Type: Commercial (Heavy duty).
5. Shape: Elongated rim, open front.
6. Hinge: Check.
7. Hinge Material: Noncorroding metal.
8. Seat Cover: Not required.
9. Color: White.

2.04 SUPPORTS

A. Water Closet Carrier:

1. Standard: ASME A112.6.1M.
2. Description: Waste-fitting assembly, as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.
- B. Examine walls and floors for suitable conditions where water closets will be installed.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Water-Closet Installation:

- 1. Install level and plumb according to roughing-in drawings.

B. Flushometer-Valve Installation:

- 1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
- 2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.

C. Install toilet seats on water closets.

D. Support Installation:

- 1. Use carrier supports with waste-fitting assembly and seal.
- 2. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.

E. Wall Flange and Escutcheon Installation:

- 1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
- 2. Install deep-pattern escutcheons if required to conceal protruding fittings.

F. Joint Sealing:

- 1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
- 2. Match sealant color to water-closet color.

3.03 CONNECTIONS

- A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

- B. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.04 ADJUSTING

- A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

- B. Adjust water pressure at flushometer valves to produce proper flow.

3.05 CLEANING AND PROTECTION

- A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed water closets and fittings.
- C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 22 42 13.16

COMMERCIAL URINALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Urinals.
 - 2. Flushometer valves.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for urinals.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

PART 2 - PRODUCTS

2.01 WALL-HUNG URINALS

- A. Urinal (UR-1): Wall hung, back outlet, washout.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following:
 - a. American Standard
 - b. Crane Plumbing, L.L.C.
 - c. Gerber Plumbing Fixtures LLC.
 - d. Kohler Co.
 - e. TOTO USA, INC.
 - 2. Fixture:
 - a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
 - b. Material: Vitreous china.
 - c. Type: Washout with extended shields.
 - d. Strainer or Trapway: Manufacturer's standard strainer with integral trap.
 - e. Water Consumption: 0.125 gal. Per flush.
 - f. Spud Size and Location: NPS 3/4, top.
 - g. Outlet Size and Location: NPS 2, back.

- h. Color: White.
- 3. Flushometer Valve: UR-1 as specified herein.
- 4. Waste Fitting:
 - a. Standard: ASME A112.18.2/CSA B125.2 for coupling.
 - b. Size: NPS 2.
- 5. Support: ASME A112.6.1M, Type I, urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture. Include rectangular, steel uprights.

2.02 URINAL FLUSHOMETER VALVES

- A. Solenoid-Actuator, Diaphragm Flushometer Valves:
 - 1. Standard: ASSE 1037/ASME 112.1037/CSA B125.37.
 - 2. Minimum Pressure Rating: 125 psig.
 - 3. Features: Include integral check stop and backflow-prevention device.
 - 4. Material: Brass body with corrosion-resistant components.
 - 5. Exposed Flushometer-Valve Finish: Chrome plated.
 - 6. Panel Finish: Chrome plated or stainless steel.
 - 7. Style: Concealed.
 - 8. Actuator: Solenoid complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
 - 9. Trip Mechanism: Hard-wired electronic sensor complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
 - 10. Consumption: 0.5 gal. 1.0 gal. per flush.
 - 11. Minimum Inlet NPS 1.
 - 12. Minimum Outlet: NPS 1-1/4.
 - 13. Power supply: Provide 120V power supply adapters with output voltage suitable for devices. Provide the quantity and required grouping required for wiring devices in each room.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before urinal installation.
- B. Examine walls and floors for suitable conditions where urinals will be installed.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Urinal Installation:

1. Install urinals level and plumb according to roughing-in drawings.
2. Install wall-hung, back-outlet urinals onto waste fitting seals and attached to supports.
3. Install accessible, wall-mounted urinal (UR-1) at mounting height for the handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:

1. Install supports, affixed to building substrate, for wall-hung urinals.
2. Use off-floor carriers with waste fitting and seal for back-outlet urinals.
3. Use chair-type carrier supports with rectangular steel uprights for accessible urinals.

C. Flushometer-Valve Installation:

1. Install flushometer-valve water-supply fitting on each supply to each urinal.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.

D. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.

E. Joint Sealing:

1. Seal joints between urinals and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to urinal color.

3.03 CONNECTIONS

- A. Connect urinals with water supplies and soil, waste, and vent piping. Use size fittings required to match urinals.
- B. Where installing piping adjacent to urinals, allow space for service and maintenance.

3.04 ADJUSTING

- A. Operate and adjust urinals and controls. Replace damaged and malfunctioning urinals, fittings, and controls.

3.05 CLEANING AND PROTECTION

- A. Clean urinals and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed urinals and fittings.
- C. Do not allow use of urinals for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 22 42 16.13

COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Lavatories and accessories.
 - 2. Faucets.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.04 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
 - 2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.01 VITREOUS-CHINA, COUNTER-MOUNTED LAVATORIES

- A. Lavatories: Oval, self-rimming, vitreous china, counter-mounted and under counter mounted.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following:
 - a. American Standard

- b. Crane Plumbing, L.L.C.
 - c. Gerber Plumbing Fixtures LLC.
 - d. Kohler Co.
 - e. Or approved equal
2. Fixture:
- a. Standard: ASME A112.19.2/CSA B45.1.
 - b. Type: Self-rimming for above-counter mounting and under-counter mounting.
 - c. Nominal Size: Oval, 20 by 17 inches.
 - d. Faucet-Hole Punching: Three holes, 2-inch centers
 - e. Faucet-Hole Location: Top.
 - f. Overflow location: Front
 - g. Color: White.
 - h. Mounting Material: Sealant.
3. Faucet (L-1): As specified herein.
4. Drain: (L-1): Chrome finished brass grid drain with overflow, removable grid strainer, and 1-1/4" tailpiece.

2.02 NOT USED

2.03 AUTOMATICALLY OPERATED LAVATORY FAUCETS

- A. Lavatory faucets intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), requirements of the Authority Having Jurisdiction (AHJ), and with NSF 61/NSF 372, or be certified in compliance with NSF 61/NSF 372 by an American National Standards Institute (ANSI) accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.
- B. Lavatory Faucets - Automatic Type: **Hardwired** Electronic Sensor Operated, **Mixing**
- C. Standards: ASME A112.18.1/CSA B125.1 and UL 1951.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Power supply: Provide 120V power supply adapters with output voltage suitable for devices. Provide the quantity and required grouping required for wiring devices in each room.
- F. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
 - 1. Body Material: Commercial, solid-brass, or die-cast housing with brazed copper and brass waterway.
 - 2. Finish: Polished chrome plate.

3. Maximum Flow Rate: 0.5 gpm.
4. Mounting Type: Deck, concealed.
 - a. Spout: Rigid type. Provide spout with a minimum dimension of 5 3/4" spout reach.
 - b. Spout Outlet: Aerator.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.
- B. Examine counters and walls for suitable conditions where lavatories will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install lavatories level and plumb according to roughing-in drawings.
- B. Install supports, affixed to building substrate, for wall-mounted lavatories.
- C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.
- D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories.

3.03 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

3.04 ADJUSTING

- A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.

3.05 CLEANING AND PROTECTION

- A. After completing installation of lavatories, inspect and repair damaged finishes.
- B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed lavatories and fittings.
- D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.13

SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.03 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 1. Motor controllers.
 2. Torque, speed, and horsepower requirements of the load.
 3. Ratings and characteristics of supply circuit and required control sequence.
 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.01 GENERAL MOTOR REQUIREMENTS

- A. Comply with NEMA MG 1 unless otherwise indicated.

2.02 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.03 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Rotor: Random-wound, squirrel cage.
- F. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- G. Temperature Rise: Match insulation rating.
- H. Insulation: Class F.
- I. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.04 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.05 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.
 - 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (NOT APPLICABLE)

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SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Duct labels.
 - 3. Stencils.
 - 4. Valve tags.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick.
 - 2. Letter Color: White.
 - 3. Background Color: Black.
 - 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number, drawing numbers where equipment is indicated (plans, details, and schedules).
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.02 DUCT LABELS

- A. Ducts shall be labeled using stencils.
- B. Letter Color: Black.
- C. Background Color: White or natural surface color if there is good contrast with black lettering.
- D. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.
 2. Lettering Size: At least 1-1/2 inches.

2.03 STENCILS

- A. Stencils: Prepared with minimum letter height of 1-1/4 inches for ducts.
 1. Stencil Material: Fiberboard or metal.
 2. Stencil Paint: Exterior, gloss, acrylic enamel white unless otherwise indicated. Paint may be in pressurized spray-can form.
 3. Identification Paint: Exterior, acrylic enamel black.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.02 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.03 DUCT LABEL INSTALLATION

- A. Stenciled Duct Label: Stenciled labels, showing service and flow direction.
- B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

END OF SECTION

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SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume exhaust air systems.

1.03 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 15 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Certified TAB reports.
- C. Sample report forms.

1.05 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC, NEBB or TABB.
 - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC, NEBB or TABB.
 - 2. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB or TABB as a TAB technician.

- B. TAB Pre-Construction Submittal: Develop and submit for Architect approval:
 - 1. TAB strategies and procedures plan to establish a mutual understanding of the process and coordination details.
 - 2. Submittal Contents:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Coordination and cooperation of trades and subcontractors.
 - d. Coordination of documentation and communication flow.
- C. Certify TAB field data reports and perform the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- D. TAB Report Forms: Use standard TAB contractor's forms approved by Architect/Engineer.
- E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.06 PROJECT CONDITIONS

- A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.07 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine operating safety interlocks and controls on HVAC equipment.
- I. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.02 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance, smoke, and fire dampers are open.

5. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
6. Windows and doors can be closed so indicated conditions for system operations can be met.

3.03 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", and in this Section.
- B. Cut insulation and ducts for installation of test probes to the minimum extent necessary for TAB procedures.
 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 2. After testing and balancing, install test ports and duct access doors.
 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish to match pre-TAB procedure conditions.
- C. Mark equipment and balancing devices, including damper-control positions, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.04 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- E. Verify that motor starters are equipped with properly sized thermal protection.
- F. Check dampers for proper position to achieve desired airflow path.
- G. Check for airflow blockages.
- H. Verify that air duct system is sealed as specified.

3.05 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 - 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 - 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 - 6. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 - 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.06 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
1. Manufacturer's name, model number, and serial number.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter thermal-protection-element rating.

3.07 TOLERANCES

- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 2. Air Outlets and Inlets: Plus or minus 10 percent.

3.08 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes

and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

- B. Status Reports: Prepare progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.09 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.

- B. Final Report Contents: In addition to certified field-report data, include the following:
 - 1. Fan curves.
 - 2. Manufacturers' test data.
 - 3. Field test reports prepared by system and equipment installers.
 - 4. Other information relative to equipment performance; do not include Shop Drawings and product data.

- C. General Report Data: In addition to form titles and entries, include the following data:
 - 1. Title page.
 - 2. Name and address of the TAB contractor.
 - 3. Project name.
 - 4. Project location.
 - 5. Architect's name and address.
 - 6. Engineer's name and address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of TAB supervisor who certifies the report.
 - 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 - 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
 13. Notes to explain why certain final data in the body of reports vary from indicated values.
 14. Test conditions for fans and pump performance forms including the following:
 - a. Settings for exhaust-air dampers.
 - b. Fan drive settings including settings and percentage of maximum pitch diameter.
 - c. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of exhaust airflows.
 2. Duct, outlet, and inlet sizes.
- E. Fan Test Reports: For exhaust fans, include the following:
1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- F. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
1. Report Data:
 - a. Location and zone.

- b. Traverse air temperature in deg F.
- c. Duct static pressure in inches wg.
- d. Duct size in inches.
- e. Duct area in sq. ft.
- f. Indicated air flow rate in cfm.
- g. Indicated velocity in fpm.
- h. Actual air flow rate in cfm.
- i. Actual average velocity in fpm.
- j. Barometric pressure in psig.

G. Instrument Calibration Reports:

- 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.10 INSPECTIONS

A. Initial Inspection:

- 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
- 2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Verify that balancing devices are marked with final balance position.
 - c. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

- 1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Commissioning Authority.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

- 1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection by the Commissioning Authority.
- 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

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SECTION 23 31 13

METAL DUCTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Single-wall round and flat-oval ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.

- B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.03 PERFORMANCE REQUIREMENTS

- A. Product Data: For each type of the following products:

1. Sealants and gaskets.

- B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.

8. Seam and joint construction.
 9. Penetrations through fire-rated and other partitions.
 10. Equipment installation based on equipment being used on Project.
 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
 12. Hangers and supports, including methods for duct and building attachment and vibration isolation.
- C. Delegated-Design Submittal:
1. Sheet metal thicknesses.
 2. Joint and seam construction and sealing.
 3. Reinforcement details and spacing.
 4. Materials, fabrication, assembly, and spacing of hangers and supports.

1.04 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 2. Suspended ceiling components.
 3. Structural members to which duct will be attached.
 4. Size and location of initial access modules for acoustical tile.
 5. Penetrations of smoke barriers and fire-rated construction.
 6. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. Perimeter moldings.
- B. Welding certificates.
- C. Field quality-control reports.

1.05 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
 - 2. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."
- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.01 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02 SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ductmate Industries, Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO LLC.

- B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).
- C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Transverse Joints in Ducts Larger Than 60 Inches in Diameter: Flanged.
- D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
 - 2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.
- E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.03 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.04 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 4 inches.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
9. Service: Indoor or outdoor.
10. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

- E. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
- F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- G. Round Duct Joint O-Ring Seals:
 - 1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
 - 2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
 - 3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.05 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- C. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- E. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

PART 3 - EXECUTION

3.01 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round and flat-oval ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.02 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 2. Conditioned Space, Exhaust Ducts: Seal Class B.

3.03 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- E. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.04 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.05 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.06 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

- B. Leakage Tests:
 - 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 - 2. Test the following systems:
 - a. Exhaust Ducts with a Pressure Class of 2-Inch wg or Higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class.
 - 3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 - 4. Test for leaks before applying external insulation.
 - 5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
 - 6. Give seven days' advance notice for testing.
- C. Duct system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.07 DUCT CLEANING

- A. Clean new duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.
 - 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
 - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
 - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 - 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
 - 1. Exhaust fans including fan housings, plenums, scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.

- E. Mechanical Cleaning Methodology:
1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.

3.08 START UP

- A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.09 DUCT SCHEDULE

- A. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
 - a. Pressure Class: Negative 1-inch wg.
 - b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.

- B. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

C. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.
2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION

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SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Manual volume dampers.
 - 2. Turning vanes.
 - 3. Flexible connectors.
 - 4. Flexible ducts.
 - 5. Duct accessory hardware.

1.03 INFORMATIONAL SUBMITTALS

- A. Source quality-control reports.

PART 2 - PRODUCTS

2.01 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.02 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

- C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.03 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Air Balance Inc.; a division of Mestek, Inc.
 - b. American Warming and Ventilating; a division of Mestek, Inc.
 - c. McGill AirFlow LLC.
 - d. Nailor Industries Inc.
 - e. Pottorff.
 - f. Ruskin Company.
 - g. Trox USA Inc.
 - h. Vent Products Company, Inc.
- 2. Standard leakage rating, with linkage outside airstream.
- 3. Suitable for horizontal or vertical applications.
- 4. Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
- 5. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.
- 6. Blade Axles: Galvanized steel.
- 7. Bearings:
 - a. Oil-impregnated bronze.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
- 8. Tie Bars and Brackets: Aluminum.

B. Jackshaft:

- 1. Size: 0.5-inch diameter.
- 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
- 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

C. Damper Hardware:

- 1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch- thick zinc-plated steel, and a 3/4-inch hexagon locking nut.

2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.04 TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Ductmate Industries, Inc.
 2. Duro Dyne Inc.
 3. Elgen Manufacturing.
 4. METALAIRE, Inc.
 5. SEMCO Incorporated.
 6. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
 1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vaness and Vane Runners," and 4-4, "Vane Support in Elbows."
- D. Vane Construction: Single wall.

2.05 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 1. Minimum Weight: 26 oz. /sq. yd.
 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 3. Service Temperature: Minus 40 to plus 200 deg F.

2.06 FLEXIBLE DUCTS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Flexmaster U.S.A., Inc.
 - 2. McGill AirFlow LLC.
 - 3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
- B. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.
 - 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
 - 2. Maximum Air Velocity: 4000 fpm.
 - 3. Temperature Range: Minus 10 to plus 160 deg F.
- C. Flexible Duct Connectors:
 - 1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action in sizes 3 through 18 inches, to suit duct size.

2.07 DUCT ACCESSORY HARDWARE

- A. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts.
 - 1. Install steel volume dampers in steel ducts.
- D. Set dampers to fully open position before testing, adjusting, and balancing.
- E. Install flexible connectors to connect ducts to equipment.

- F. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- G. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.
- H. Connect diffusers or light troffer boots to ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.
- I. Connect flexible ducts to metal ducts with adhesive .

3.02 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect turning vanes for proper and secure installation.

END OF SECTION

SECTION 23 34 00

HVAC FANS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes: For each product.
 - 1. Centrifugal roof ventilators.

1.03 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base fan-performance ratings on sea level.
- B. Operating Limits: Classify according to AMCA 99.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Include rated capacities, furnished specialties, and accessories for each fan.
 - 2. Certified fan performance curves with system operating conditions indicated.
 - 3. Certified fan sound-power ratings.
 - 4. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 5. Material thickness and finishes, including color charts.
 - 6. Dampers, including housings, linkages, and operators
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

3. Include diagrams for power, signal, and control wiring.
 4. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
- C. Operation and Maintenance Data: For HVAC fans to include in emergency, operation, and maintenance manuals.

1.05 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.
- C. UL Standards: HVAC fans shall comply with UL 705. HVAC fans for use for restaurant kitchen exhaust shall also comply with UL 762.

1.06 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided.
- C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- D. Existing roof curbs shall be reused for existing exhaust fan replacement. Provide transition curbs as required for new exhaust fans.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. AMCA Compliance:
 1. Comply with AMCA performance requirements and bear the AMCA-Certified Ratings Seal.
 2. Operating Limits: Classify according to AMCA 99.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Capacities and Characteristics: Refer to drawings.
 - 1. See Schedule on Drawings.

2.02 CENTRIFUGAL ROOF VENTILATORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Greenheck Fan
 - 2. Acme Fan
 - 3. Loren Cook Company
 - 4. Aerovent
 - 5. Twin City Fan & Blower
 - 6. Or Approved Equal
- B. Housing: Removable, galvanized steel, mushroom-domed top; square, one-piece, aluminum base with venturi inlet cone.
 - 1. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.
- C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- D. Belt Drives:
 - 1. Resiliently mounted to housing.
 - 2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - 3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - 4. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 - 5. Fan and motor isolated from exhaust airstream.
- E. Accessories:
 - 1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit
 - 2. Bird Screens: Removable, 1/2-inch (13-mm) mesh, aluminum or brass wire.
 - 3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
 - 4. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

F. Capacities and Characteristics: Refer to drawings.

1. See Schedule on Drawings.

2.03 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 20 05 13 "Common Motor Requirements for Mechanical, Plumbing and Fire Suppression.

2.04 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210/ASHRAE 51, "Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating."

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install centrifugal fans level and plumb.

B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.

C. Lift and support units with manufacturer's designated lifting or supporting points.

D. Unit Support: Install centrifugal fans level on structural curbs. Secure units to structural support with anchor bolts.

E. Install units with clearances for service and maintenance.

F. Label fans according to requirements specified in Section 20 05 53 "Identification for HVAC Equipment."

3.02 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

- B. Install ducts adjacent to fans to allow service and maintenance.
- C. Install piping from scroll drain connection, with trap with seal equal to 1.5 times specified static pressure, to nearest floor drain with pipe sizes matching the drain connection.

3.03 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.
 - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - 5. Adjust belt tension.
 - 6. Adjust damper linkages for proper damper operation.
 - 7. Verify lubrication for bearings and other moving parts.
 - 8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 - 9. See Section 200593 "Testing, Adjusting, and Balancing for Mechanical and Plumbing" for testing, adjusting, and balancing procedures.
 - 10. Remove and replace malfunctioning units and retest as specified above.
- D. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.04 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain centrifugal fans.

END OF SECTION

SECTION 23 37 13

DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Rectangular and square ceiling diffusers.
 - 2. Perforated grilles.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
 - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - 2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

PART 2 - PRODUCTS

- A. Exhaust Air Grille:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Air Research Diffuser Products, Inc.
 - b. A-J Manufacturing Co., Inc.
 - c. Anemostat Products; a Mestek company.
 - d. Carnes.
 - e. Hart & Cooley Inc.
 - f. Krueger.
 - g. METALAIRE, Inc.
 - h. Nailor Industries Inc.
 - i. Price Industries.
 - j. Titus.
 - k. Tuttle & Bailey.
 - l. Warren Technology.
 - 2. Material: Steel backpan and pattern controllers, with aluminum face.

3. Finish: Baked enamel, white.
4. Face Size: 24 by 24 inches.
5. Duct Inlet: Round or rectangular.
6. Face Style: Flush.
7. Mounting: Surface.
8. Dampers: Opposed blade.

2.02 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.03 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION

SECTION 26 00 00

GENERAL ELECTRICAL PROVISIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes general requirements for interior electrical distribution systems.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 APPLICABLE STANDARDS AND CODES

- A. The latest edition of each of the standards and codes listed below shall form a part of this specification as if they were included herein. Where conflicts occur between these documents and this specification, contact the Engineer in writing for interpretation.
 1. Local, City, State, and National Codes
 2. NEC National Electrical Code (NFPA 70), 2017 edition
 3. NFPA National Fire Protection Association
 4. ANSI American National Standards Institute
 5. NEMA National Electrical Manufacturers Association
 6. UL Underwriters Laboratories
 7. IEEE Institute of Electrical and Electronic Engineers
 8. NESC National Electrical Safety Code
 9. OSHA Occupational Safety and Health Administration
 10. Rules of the Local Electrical Utility
 11. Life Safety Code 101

1.05 FEES AND TESTS

- A. Contractor shall be responsible for all fees for permits, inspections, and tests necessary to complete this work. Contractor shall demonstrate to the SCO and the Engineer that all items of equipment installed are completely operational and free of defects under all operating conditions.

1.06 COORDINATION WITH OTHER TRADES

- A. Furnish and locate all anchor bolts, inserts and supports for installation by the other trades as required. Coordinate the location of all fixtures, outlets, equipment, and devices with other trades to avoid conflicts.
- B. Provide all power wiring (120 volts and above) and terminations for all HVAC equipment. Coordinate with HVAC contractor as required for complete installation.
- C. The Contractor shall in no way hinder the completion and schedule of the project. The Contractor shall coordinate and provide a skilled installer for all rough-in required in or below the building slab, masonry walls or other building construction such that the work required by other trades may be completed as required and scheduled.
- D. Coordinate size and rating of actual equipment to be provided by other trades. If size and rating differ from that specified on the drawings, contact the Engineer to obtain written clarifications.

1.07 LIST OF PROPOSED MANUFACTURERS

- A. List of Proposed Materials: The Contractor shall submit a complete list of the proposed manufacturers for each of the items listed in the following electrical specifications. Additional submittal data, sufficient to determine equality, shall be required if the Contractor proposes to substitute another manufacturer's equipment.

~~1.08~~ QUALITY ASSURANCE

- A. Responsibility: The Contractor shall be responsible for completing systems in accordance with the intent of these Contract Documents:
 - 1. Coordinating the details of facility equipment and construction for all Specification divisions that affect the work covered under Division 26, Electrical.
 - 2. Furnishing and installing all incidental items not actually shown or specified, but which are required by good practice to provide complete functioning systems.
- B. Intent of Drawings: Electrical plan drawings show only general locations of equipment, devices and raceways, unless specifically dimensioned. The Contractor shall be responsible for the proper routing of raceway, subject to the review of the Engineer.
- C. Departures from Contract Documents: Submit to the Engineer in writing details of any necessary, proposed departures from these Contract Documents, and the reasons for the departures. Submit such requests as soon as practicable and within 30 days after award of the Contract. Make no such departures without written review of the Engineer.
- D. Substitution of Materials and Equipment: In accordance with provisions elsewhere in these Contract Documents, manufacturers' names and catalog numbers stated herein are intended to indicate the type and quality of equipment or materials desired. Unless substitution is specifically forbidden, proposed alternatives may be submitted for review.

PART 2 - PRODUCTS

2.01 REFERENCE TO DRAWINGS

- A. Reference shall be made to Drawing Schedules, Details, Notes, and manufacturer's specifications for: Manufacturer, model, catalog number, size, capacity, performance, ratings and installation of equipment and material.

2.02 CHOICE OF MATERIALS AND EQUIPMENT

- A. In submitting substitutions, bidders should note the following minimum considerations: (1) capacities shown are absolute minimal and must be equaled, (2) physical size limitations for space allotted, (3) structural properties, (4) noise level, (5) interchangeability, (6) compatibility with other materials and assemblies, (7) similar items shall be same manufacture and style wherever possible.
- B. All material and equipment, for which a UL, ANSI, or a NEMA Standard is established, shall be so approved and labeled or stamped.
- C. Adhesives are not acceptable as a mounting, supporting, or assembling technique, unless noted otherwise.

2.03 ELECTRICAL EQUIPMENT

- A. NEMA standards shall be taken as minimum requirements for electrical equipment.
- B. Equipment shall operate properly under a plus or minus 10 percent voltage variation.

2.04 SUBMITTALS DURING CONSTRUCTION

- A. Provide complete manufacturers' descriptive information and shop drawings for all equipment, material and devices furnished under Division 26, Electrical, including certified outline drawings, arrangement drawings, elementary (schematic) diagrams, interconnection and connection diagrams, in accordance with provisions elsewhere in these Contract Documents. Provide the number of copies specified herein for the Engineer, Contractor and Operation and Maintenance Manuals.
- B. Provide certified shop drawings, literature and requested samples showing items proposed for use, size, dimensions, capacity, special features required, schematic (elementary) control diagrams, equipment schedules, rough-in, etc., as required by the Engineer for complete review and for use during installation.
 - 1. Use NEMA device designations and symbols for all electric circuit diagrams submitted. Make content of the schematic (elementary) connection or interconnection diagrams in accordance with the latest edition of NEMA ICS 1.
- C. Manufacturer's standardized elementary diagrams will not be acceptable unless applicable portions of the diagram have been clearly identified and non-applicable portions deleted or crossed out.
- D. All submittals shall be made in accordance with Division 1, General Requirements.

- E. Certified arrangement drawings, outline dimensions, and weights for all major (engineered) equipment including, but not limited to:
 - 1. Low voltage panelboards.
 - 2. Motor starters/disconnects.
 - 3. Individually mounted circuit breakers.
- F. Characteristic curves for all protective devices.
- G. Certified drawings and descriptive literature for all equipment and devices furnished under Division 26, Electrical, and not listed above.
- H. In addition to submittals for specific items mentioned above, furnish manufacturers product data on the following items:
 - 1. Separately mounted circuit breakers, fused switches, and non-fused disconnect switches.
 - 2. Wireway.
 - 3. Outlet and device boxes (Both interior and exterior surface mount).
 - 4. Pull boxes and junction boxes.
 - 5. Terminal junction boxes.
 - 6. Power cable.
 - 7. Lighting fixtures.
 - 8. Emergency lighting units.
 - 9. Receptacles.
 - 10. Light switches.
 - 11. Device plates.
 - 12. Control relays and timers.

PART 3 - EXECUTION

3.01 WIRING ELECTRICALLY OPERATED EQUIPMENT

- A. The Contractor shall be responsible for all electrical connections to all equipment requiring electrical power. This responsibility applies to equipment furnished under this and other Divisions and where furnished by the Owner.

3.02 RECORD AND AS-BUILT DOCUMENTS

- A. Maintain at the job site a set of Contract Documents kept current by indicating thereon all changes, revisions and substitutions, between work as specified and as installed.

3.03 CIRCUIT CONTINUITY

- A. Complete installation shall be free of short circuits, grounds, open circuits, and other defects. Tests shall be made as required to prove that all parts of installation meet specified performances.

3.04 CLEANING AND PAINTING

- A. Fixtures, panels and equipment shall be thoroughly cleaned. All equipment shall be touched up or repainted as required to present a clean professional appearance. Paint all ferrous metal that is not otherwise protected against corrosion.

3.05 IDENTIFICATION

- A. Identify all major items of equipment including controls, panels, switches, contactors, motor starters, junction boxes and metering by permanent nameplates, with wording approved by Engineer. Secure metal nameplate frame with screws or brads. Double-sided tape or adhesives are acceptable means for label installations.
- B. Nameplates after installation shall be easily visible and shall bear notations corresponding to those shown on record drawings.
- C. All feeder conduits serving panelboards shall be identified with a stamped stainless steel tag system (Brady or approved equal). Conduit tags shall be permanently attached to each exposed end of conduit runs such as in pull boxes, panels, junction boxes, etc. and at each point of entry into a structure or building. Each tag shall be stamped with the appropriate conduit number per the conduit and cable schedules.
- D. Each cable shall be identified with a permanent labeling system with printed legends.
- E. All power panels, lighting panels, etc. shall be identified with permanently mounted phenolic labels.
- F. All power and lighting panels shall have typed schedules mounted on panel doors.

3.06 TEST PERIOD

- A. Each piece of equipment shall continue to meet performance specifications throughout the first year of actual operation. Contractor shall replace or repair any defect due to faulty workmanship or material that shall develop within 1 year from date of acceptance. This guaranty shall cover both material and labor.
- B. For first year after final acceptance, Contractor shall provide, at no cost to Owner, any required warranty service necessary to assure the proper operation of the system. Engineer shall certify date of acceptance as that date that the contract has been satisfactorily completed in accordance with the Contract Documents.

3.07 GROUNDING

- A. See section 26 05 26 entitled "Grounding and Bonding" of these Specifications.

3.08 INSTALLATION OF EQUIPMENT

- A. The electrical Contractor shall coordinate with the General Contractor and Owner in order to have electric power available when required.

3.09 TEMPORARY ELECTRIC POWER

- A. Refer to General Conditions in these Contract Documents for necessary provisions for electric power used during construction.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CABLES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.01 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Alcan Products Corporation; Alcan Cable Division.
 - 2. Belden Inc.
 - 3. General Cable Technologies Corporation.
 - 4. Southwire Incorporated.
 - 5. Or Engineer Approved equal
- B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN/THWN.

2.02 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hubbell Power Systems, Inc.
 2. Ideal Industries, Inc.
 3. Ilsco; a branch of Bardes Corporation.
 4. NSi Industries LLC.
 5. 3M; Electrical Markets Division.
 6. Or Engineer Approved equal.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.03 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with National Electric Code (NFPA 70), 2017 edition.

PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN/THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN/THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN, single conductors in raceway.
- D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN, single conductors in raceway.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

- B. Complete raceway installation between conductor and cable termination points prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables with suitable clips at points no greater than 4 feet on center.

3.04 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Joints in solid conductors shall be spliced using Ideal "wirenuts", 3M Company "Scotchlock" or T&B connectors. "Sta-kon" or other permanent type crimp connectors shall not be used for branch circuits.
 - 2. 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 U/L approved insulating covers shall be acceptable, in place of mechanical connectors plus tape.
 - 3. Conductors, in all cases, shall be continuous from outlet to outlet and no splicing shall be made except within outlet, or junction box, troughs, or gutters.
 - 4. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.05 IDENTIFICATION

- A. Modify and color-code conductors and cables according to notes on drawings.

3.06 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.
FIRESTOPPING

- B. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

END OF SECTION 26 05 19

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes grounding and bonding systems and equipment.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 QUALITY ASSURANCE

- A. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Burndy; Part of Hubbell Electrical Systems.
 2. ERICO International Corporation.
 3. Fushi Copperweld Inc.
 4. Galvan Industries, Inc.; Electrical Products Division, LLC.
 5. ILSCO.
 6. Siemens Power Transmission & Distribution, Inc.
 7. Or Engineer Approved equal.

2.02 SYSTEM DESCRIPTION

- A. Comply with UL 467 for grounding and bonding materials and equipment.

2.03 CONDUCTORS

- A. Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction. Insulated conductors shall be colored solid green.
- B. Conductors intended as neutral shall be colored solid white.

2.04 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.05 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

PART 3 - EXECUTION

3.01 APPLICATIONS

- A. Conductors: Install solid conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger unless otherwise indicated.
- B. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Structural Steel: Welded connectors.

3.02 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.
- B. Install insulated equipment grounding conductors with all panelboard feeders in accordance with notes on drawings.

- C. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70, 2017 edition:
 - 1. Three-phase motor and appliance branch circuits.
- D. The electrical service shall be grounded by three (3) means:
 - 1. To the metallic cold water pipe, as per NEC Article 250-52
 - 2. To the steel frame of the building, provided the building frame is effectively grounded.
 - 3. To ground rod(s). Ground rods shall be 10 feet long and $\frac{3}{4}$ inch diameter, and shall be copper-clad construction. All ground connections shall be accessible.

3.03 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade. Make connections without exposing steel or damaging coating if any.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

END OF SECTION 26 05 26

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SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Metal conduits, tubing, and fittings.
 - 2. Boxes, enclosures, and cabinets.

1.03 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.
- C. EMT: Electro-Metallic Tubing

1.04 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

PART 2 - PRODUCTS

2.01 METAL CONDUITS, TUBING, AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Allied Tube & Conduit.
 - 2. Anamet Electrical, Inc.
 - 3. Electri-Flex Company.
 - 4. Republic Conduit.
 - 5. Southwire Company.
 - 6. Thomas & Betts Corporation.

7. Western Tube and Conduit Corporation.
 8. Wheatland Tube Company.
 9. Or Engineer Approved equal.
- B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. GRC: Comply with ANSI C80.1 and UL 6.
- D. IMC: Comply with ANSI C80.6 and UL 1242.
- E. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
1. Comply with NEMA RN 1.
 2. Coating Thickness: 0.040 inch, minimum.
- F. EMT: Comply with ANSI C80.3 and UL 797.
- G. Fittings for Metal Conduit: Comply with NEMA FB1 and UL 514B.
1. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Compression.
 2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- H. Joint Compound for IMC, or GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.02 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Adalet.
 2. Cooper Technologies Company; Cooper Crouse-Hinds.
 3. EGS/Appleton Electric.
 4. Erickson Electrical Equipment Company.
 5. Hoffman.

6. Hubbell Incorporated.
 7. RACO; Hubbell.
 8. Thomas & Betts Corporation.
 9. Wiremold / Legrand.
 10. Or Engineer Approved equal.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- F. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- G. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- H. Gangable boxes are allowed.
- I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- J. Cabinets:
1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.01 RACEWAY APPLICATION

- A. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Not Subject to Severe Physical Damage: EMT, RNC identified for such use.
 3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
 - a. Warehouse areas within 10 feet of floor.
 - b. Traffic areas of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 6. Damp or Wet Locations: GRC.
 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- B. Minimum Raceway Size: 1/2-inch trade size, unless otherwise noted on drawings.
- C. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

3.02 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Complete raceway installation before starting conductor installation.
- C. Comply with NEC requirements for hangers and supports.
- D. Install no more than the equivalent of three 90-degree bends in any conduit run. Support within 12 inches of changes in direction.

- E. Install conduits parallel or perpendicular to building lines.
- F. Support conduit within 12 inches of enclosures to which attached.
- G. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- H. Threaded Conduit Joints: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- I. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- J. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- K. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- L. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- N. Surface Raceways:
 - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- O. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- P. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

- Q. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to top of box unless otherwise indicated.
- R. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- S. Fasten all new and existing junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- T. Set metal floor boxes level and flush with finished floor surface.
- U. Relocate all j-boxes above plaster ceilings to an accessible location. Conduit shall run from the accessible location to the final device uninterrupted. No junction box or conduit body with removable cover shall be mounted in an inaccessible location.

3.03 IDENTIFICATION

- A. Stamped stainless steel tag: Conduit tags shall be permanently attached to each exposed end of conduit runs such as in manholes, pull boxes, panels, junction boxes, etc., and at each point of entry into the building. Each tag shall be stamped with the appropriate conduit number

3.04 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior wall assemblies.

3.05 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.06 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 05 33

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Nameplates and labels.
- B. Wire and cable markers.
- C. Conduit markers.

1.02 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; 2017.

1.03 SUBMITTALS

- A. Product Data: Provide catalog data for nameplates, labels, and markers.

1.04 QUALITY ASSURANCE

- A. Conform to requirements of National Electric Code (NFPA 70) 2017 edition.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Seton Identification Products: www.seton.com/aec.
- C. HellermannTyton: www.hellermannntyton.com.

2.02 NAMEPLATES AND LABELS

- A. Nameplates: Permanent engraved three-layer laminated plastic, white letters on black background. Wording to be approved by Architect.
- B. Locations:
 - 1. Each power panel, lighting panel, motor starter, safety disconnect switch, and control equipment enclosure.
 - 2. Communication cabinets.

- C. Letter Size:
 - 1. Use 1/8 inch letters for identifying individual equipment and loads.
 - 2. Use 1/4 inch letters for identifying grouped equipment and loads.
- D. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, and control device stations.

2.03 WIRE MARKERS

- A. Description: tape, split sleeve, or tubing type wire markers.
- B. Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, and junction boxes each load connection.
- C. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

2.04 CONDUIT MARKERS

- A. Description: Stamped stainless steel tag. Conduit tags shall be permanently attached to each exposed end of conduit runs such as in manholes, pull boxes, panels, junction boxes, etc., and at each point of entry into the building. Each tag shall be stamped with the appropriate conduit number.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.02 INSTALLATION

- A. Install nameplates and labels parallel to equipment lines.
- B. Secure nameplates to equipment front using screws.
- C. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.
- D. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

END OF SECTION

SECTION 26 09 23

LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Time switches.
2. Photoelectric switches.
3. Standalone daylight-harvesting switching and dimming controls.
4. Indoor occupancy and vacancy sensors.
5. Switchbox-mounted occupancy and vacancy sensors
6. High-bay occupancy and vacancy sensors.

B. Related Requirements:

1. Section 26 27 26 "Wiring Devices" for wall-box dimmers, non-networkable wall-switch occupancy sensors, and manual light switches.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Show installation details for the following:
 - a. Occupancy sensors.
 - b. Vacancy sensors.
2. Interconnection diagrams showing field-installed wiring.
3. Include diagrams for power, signal, and control wiring.

1.03 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and elevations, drawn to scale and coordinated with each other, using input from installers of the items involved.

B. Field quality-control reports.

- C. Sample warranty.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.
- B. Software and firmware operational documentation.

1.05 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Leviton
- B. Lutron
- C. Hubbel
- D. General Electric

2.02 INDOOR OCCUPANCY AND VACANCY SENSORS

- A. General Requirements for Sensors:
 - 1. Ceiling-mounted, solid-state indoor occupancy and vacancy sensors.
 - 2. Passive infrared and Ultrasonic: Dual technology.
 - 3. Integrated power pack.
 - 4. Hardwired connection to switch.
 - 5. Listed and labeled as defined in NFPA70, by a qualified testing agency, and marked for intended location and application.
 - 6. Operation:
 - a. Occupancy Sensor: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.

- b. Vacancy Sensor: Unless otherwise indicated, lights are manually turned on and sensor turns lights off when the room is unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 - c. Combination Sensor: Unless otherwise indicated, sensor shall be programmed to turn lights on when coverage area is occupied and turn them off when unoccupied, or to turn off lights that have been manually turned on; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 - 7. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A.
 - 8. Power: Line voltage.
 - 9. Power Pack: Dry contacts rated for 20-A LED load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
 - 10. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 - 11. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
 - 12. Bypass Switch: Override the "on" function in case of sensor failure.
 - 13. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lux); turn lights off when selected lighting level is present.
- B. Dual-Technology Type: Wall or Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
- 1. Sensitivity Adjustment: Separate for each sensing technology.
 - 2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
 - 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
 - 4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 1000 square feet (110 square meters) when mounted 48 inches (1200 mm) above finished floor.

2.03 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox, with provisions for connection using hardwired connection.
1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application, and shall comply with California Title 24.
 2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F (0 to 49 deg C).
 4. Switch Rating: Not less than 800-V LED load at 120 V.
- B. Wall-Switch Sensor Tag WS1:
1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft. (84 sq. m).
 2. Sensing Technology: Dual technology - PIR and ultrasonic.
 3. Switch Type: SP, dual circuit. SP, manual "on," automatic "off."
 4. Capable of controlling load in three-way application.
 5. Voltage: Match the circuit voltage.
 6. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
 7. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
 8. Concealed, "off" time-delay selector at 30 seconds and 5, 10, and 20 minutes.
 9. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
 10. Color: White.
 11. Faceplate: Color matched to switch.

2.04 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with NECA 1.
- B. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.
- C. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- D. Install and aim sensors in locations to achieve not less than 90-percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.
- E. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.02 WIRING INSTALLATION

- A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch (13 mm).
- B. Wiring within Enclosures: Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.03 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."
- B. Label time switches and contactors with a unique designation.

3.04 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Lighting control devices will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.05 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
 - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
 - 2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
 - 3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.06 SOFTWARE SERVICE AGREEMENT (If applicable)

- A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - 1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

3.07 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Wall switches.
- B. Wall dimmers/motion sensors.
- C. Receptacles.
- D. Device plates and decorative box covers.
- A. Comply with UL 467 for grounding and bonding materials and equipment.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2005).
- C. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association; 2002.
- D. NFPA 70 - National Electrical Code; National Fire Protection Association; 2017.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- B. Manufacturer's Installation Instructions.
- C. Provide products listed and classified by Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Cooper Wiring Devices: www.cooperwiringdevices.com.
- B. GE Industrial: www.geindustrial.com.
- C. Leviton Manufacturing, Inc: www.leviton.com.

2.02 WALL SWITCHES

- A. Wall Switches: Heavy Duty, AC only general-use snap switch, complying with NEMA WD 6 and WD 1.
 - 1. Body and Handle: Grey plastic with toggle handle.
 - 2. Ratings:
 - a. Voltage: 120 - 277 volts, AC.
 - b. Current: 20 amperes minimum.
- B. Switch Types: Single pole, double pole, and 3-way.

2.03 RECEPTACLES

- A. Receptacles: Heavy duty, complying with NEMA WD 6 and WD 1.
 - 1. Device Body: Grey plastic.
 - 2. Configuration: NEMA WD 6, type as specified and indicated.
- B. GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements. Grey plastic

2.04 WALL PLATES

- A. Decorative Cover Plates: Smooth stainless steel.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that outlet boxes are installed at proper height.
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.03 INSTALLATION

- A. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- E. Do not share neutral conductor on load side of dimmers.
- F. Install receptacles with grounding pole on top.
- G. Connect wiring device grounding terminal to outlet box with bonding jumper.
- H. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- I. Connect wiring devices by wrapping conductor around screw terminal.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Install wall switch 48 inches above finished floor.
- B. Install convenience receptacle 18 inches above finished floor.
- C. Install convenience receptacle 6 inches above counter.
- D. Install dimmer 48 inches above finished floor.
- E. Install telephone jack 18 inches above finished floor.

3.05 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.

3.06 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.07 CLEANING

A. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 12 18 J6
ENCLOSEG CONTROLLERS

HART J ev ENERAL

J9J S- MMARU

AP S-Yti o to Yfi u-d cs- :i mi mtow-o Yfi d-u Yi odi m-hd hr e-u 299 V rou n-dca
JP yl m/ i m w- g rwo-dYP

J91 GEyINITIONS

AP CHTaCi odi npi m-hdrod:i hg -hP
5 P MCC5 aMi n-ueYf d- Yhm tcbh-rx-hP
CP MCHaMi a h Yhm tcphi e-Yi hP
GP NtCaNi hg r mB Yfi d-uP
EP NtCaNi hg r mBi p-oP
yP OCHGaO/ -hM h-ocphi e-Yt/ -u- tYP

J96 ACTION S- 5 MITTALS

AP Hli ul YcGrayih-r Ys dP-i: -oYfi d-u Yi odi m-hP
5 P Ssi p Ghrmtowda yi h -r Ys -oYfi d-u Yi odi m-hP Io Yfi u- utg -odti o-u p r o d q -n/ r d i o d q d- Yti o d q u- a t r d q rou h-7l th-u
Yn-r h o Y-drou d-h tY- dpr Y-d r h i l ou Yi odi m-h-oYfi dl h-dP
JP " tltowGtrwlr g dayi hpi m-hqdtwormprou Yi odi nmthtowP

J9. INyORMATIONAL S- 5 MITTALS

AP yt-nu 7l r r t c B e Y i o d i n h - p i h d P

J9W CLOSEO- T S- 5 MITTALS

AP Op-hr di o rou g r toc-oroY-ur aP

J192 f - ALITU ASS- RANCE

- AP En-YdtYrn Ci g pi o-oadqG-/tYdqrou AYY-ddi ht-da Ltde-u rou nr b-nu rd u:-to-u to NyHA , 9qbBr 7l rrt:t-u e-dtow rw-oYBqrou g rlx-u :i htoc-ou-u ni Yrdi o rou rpprtYrdi oP
- 5P Ci g prBmtcs Nrcti ornEn-YdtYCi u-kNyHA , 9F19J, -utcti oP
- CP IEEE Ci g ptroY-ayrbtYre-rou e-de-oYri d-u Yi odi m-hdrYi hutowci IEEE 6. . ci mtsdr ou d-tdg tY:i hY-du:-to-u to S-Yti o 129W4B2 (S-tdg tYCi odi nl:i hEn-YdtYrnSBde-g dR

HART 1 eHROG- CTS

119J ACCEHTA5 LE MAN- yACT- RERS

- AP S7l rh- G
- 5P Cl α-h) rg g -h
- CP Am-oe5 lr un-B
- GP v E
- EP St-g -od
- yP Ohrd rpphi / -u bBcs -Eowto -hP

1191 y- LLeVOLTAv E CONTROLLERS

- AP v -o-lrnR-7l th-g -oad:i hyl mēVi nrw- Ci odi m-hda Ci g prBmtcs NEMA ICS 1qw-o-lrnpl hpi d-qCrrdd AP
- 5P Mi ci hēSchtow SmtcYs-da (f l tYxeg rx-q7l tYxebh-rx(ci wna- i hpl dsebl ai o rYti o' g rlx-u ci dsi m ms-cs-hl otc tdi :: i hi oP
 - JP Ci o:twl hrcti oaNi oh- /-hdtowP
 - 1P Sl hrY-g i l odtowP
 - 6P Htri crtws dP
- CP ylrYti orn) i hl-pi m-hMrol rnCi odi m-hda (f l tYxeg rx-q7l tYxebh-rx(ci wna- i hpl dsebl ai o rYti o' g rlx-u ci dsi m ms-cs-hl otc tdi ::qi oqi hdtpp-uP
 - JP Ci o:twl hrcti oaNi oh- /-hdtowP
 - 1P O/ -hri ru R-nBda lo/ -hd-ctg -eYl h-oc Ysrlr Ye-htdtYd NEMA ICS 1qCrrdd J9 dtpptow Ysrlr Ye-htdtYd s-re-hd g rēYs-u ci org -pre-:l nri ru Yl h-oci : rYd rnphi e-Ye-u gi ci hl -; e-hornh-d-cpl ds bl ai o btg -α nY dP-P

6P Sl hrY-g i l o towP

. P Htri crtvs dP

GP Ioe-wlrn) i hd-pi m-h Mrol rn Ci odi m-hda (f l tYXeg rx-q 7l tYXebh-rx(a wwn- i h pl ds ebl ai o rYti o' g rlx-u a dsi m ms-cs-hl otctdi ::qi oqi h dtpuP

JP Ci o:twl hr di oaNi oh- /-hd towP

1P O/ -hri ru R-r Bda Io/ -hd-ctg -eY lh-oc Ysr lr Ye-hd dYd NEMA ICS 1qC rdd J9 dtpptow Ysr lr Ye-hd dYd s-re-hd rou d-odi hd to -rYs psrd-q g r cYs-u a org -pre- :l mri ru Y lh-oc i: rYd rn pli e-Ye-u g i a h rou sr/ tow rppli pltre- rujl dg -oc:i hul dBYBn' -; e-hornh-d-cpl ds bl ai o btg -cmtY dP

6P Sl hrY-g i l o towP

. P Htri crtvs dP

EP Mrwo-dYCi odi m-hdayl m/ i nrw-qr Yhi dds- rto-q-n-YdtYrnBs-nuP

JP Ci o:twl hr di oaNi oh- /-hd tow

1P Ci ocr Yci hCi trda Hh-ddl h-e-oYfcdl rre-u dP-P

rP Op-hr tow Vi nrw-a G-p-outow i o Yi ocr Yci h NEMA dtz- rou rto-e/ i nrw- hr towq g rol :rYd h-hX drou rlu g r cYs tow Yi odi npi m-hi hito- / i nrw-P

6P Hi m-h Ci ocr Yda Ti crnB -oYhi d-uq ui l bn-ebh-rxq dtr/ -heYrug tlg i ;tu-' rdd-g bn-u a rmi m todp-Yti o rou h-pr Y-g -ocmts i l cutdd lbtowrto- i hri ru mlrtowP

. P Ci odi n CthYl tda J19eV rY i barto-u :hi g toe-wlrn CHTq mts pltg rhB rou d-Yi ourhB :l d-d i: dl ::tY-oc Yrpr YcBa i p-lre- toe-wlrnu- / tY-drou h-g i e-rBni Yre-u ptni qatoutYr towqrou Yi odi nu- / tY-dP

WP M-rtowAmi BO/ -hri ru R-r Bda

rP Io/ -hd-ctg -eY lh-oc Ysr lr Ye-hd dYd

bP Crrdd 19 dtpptow Ysr lr Ye-hd dYd

Yp) -re-hd to -rYs psrd- g r cYs-u a org -pre- :l mri ru Y lh-oc i: rYd rn pli e-Ye-u g i a h rou mts rppli pltre- rujl dg -oc:i hul dBYBn-P

2P 5tg -cmtYO/ -hri ru R-r Bda

rP Io/ -hd-ctg -eY lh-oc Ysr lr Ye-hd dYd

bP Crrdd 19 dtpptow Ysr lr Ye-hd dYd

Yp) -re-hd to -rYs psrd- g r cYs-u a org -pre- :l mri ru Y lh-oc i: rYd rn pli e-Ye-u g i a h rou mts rppli pltre- rujl dg -oc:i hul dBYBn-P

, P Si rtueSc e- O/ -hri ru R-r Ba

rP SmtcYs i hutrnd-n-Yr bn- :i hg i a hhl ootowi / -hri ru pli e-Yti oP

bP S-odi hd to -rYs psrd-P

YP Crrdd 19 dtptow Ysrhr Yc-hddY d-n-Ye-u ai phi e-Yc gi ai hrwrtoc / i nrw- rou Ylh-oc l obrroY- rou dtow- psrdtowP

4P E; e-horni / -hri ru h-d-cpl ds bl ai oP

yP Ci g btorai o Mrwo-ai Ci odi m-ha yr Yi hBcdd-g bn-u Yi g btorai o i : g rwo-ai Yi odi m-hq OCHGqrou utdYi oo-Yatow g -rodP

JP yldtbn- GtdYi oo-YatowM-roda

rP NEMA KS Jqs-r/ Baul dQsi hd-pi m-herc-uq:l dtbn- dntcYs mts Ytpd i h bi rc prud ai rYi g gi ure- Crrdd R :l d-dP

bP Li Yrbn-) roun-aAYY-pal ash- pruni Ydrou toe-hi Ydmts Yi / -hto Yi d-u pi dtai oP

1P Al ; ttrhBCi ocr Yda NIOENCRrhr row-u ai rYt/ re- b-:i h- dntcYs br u-di p-oP

6P Ni o:l dtbn- GtdYi oo-YatowM-roda

rP NEMA KS Jqs-r/ Baul dQsi hd-pi m-herc-uqoi o:l dtbn- dntcYsP

bP Li Yrbn-) roun-aAYY-pal ash- pruni Ydrou toe-hi Ydmts Yi / -hto Yi d-u pi dtai oP

YP Al ; ttrhBCi ocr Yda NIOENCRrhr row-u ai rYt/ re- b-:i h- dntcYs br u-di p-oP

. P MCHGtdYi oo-YatowM-roda

rP - L . 48qNEMA A5 Jqrou NEMA A5 6qmts toe-hi ptowYrpr YdB ai Yi g prB mts r/ rtrbn- :rl rc Ylh-oadq todrcro- il dai orB YhYl tc bh-rx-h mts :hi oeg il oe-uq :t-nuerujl drbn-q ds i hceYhYl tc dtp Yi i lutore-u mts gi ai hri Yk-uchi ai hrg p-h-dP

bP Li Yrbn-) roun-aAYY-pal ash- pruni Ydrou toe-hi Ydmts Yi / -hto Yi d-u pi dtai oP

YP Al ; ttrhBYi ocr Yd(rou (b(rhr row-u ai rYt/ re- mts MCHsroun-P

WP MCC5 GtdYi oo-YatowM-roda

rP - L . 48qNEMA A5 Jqrou NEMA A5 6qmts toe-hi ptowYrpr YdB ai Yi g prB mts r/ rtrbn- :rl rc Ylh-oad' as-lg rreg rwo-ai MCC5 q mts to/ -hd- dg -eYlh-oc -ng -oc :i h ni men/ -ni / -hri rud rou todrcro- il dg rwo-ai Ydtp -ng -oc:i hds i hc YhYl tadP

bP yhi oeg il oe-uqruij drbn- g rwo-ai Ydtp d-ctow:i h YhYl tcebh-rx-h:hr g - dtz-d l W A rou rrlw-hP

YP Li Yrbn-) roun-aAYY-pal ash- pruni Ydrou toe-hi Ydmts Yi / -hto Yi d-u pi dtai oP

uP Al ; ttrhBYi ocr Yd(rou (b(rhr row-u ai rYt/ re- mts MCC5 sroun-P

1D6 ENCLOS- RES

AP EoYi d-u Ci odi m-hda NEMA ICS 2qci Yig prBmtes -o/ thi og -oarn Yi outdi odrctodrm-u ni Yfti oP

JP GhBrou Cn-ro Ioui i hLi Yfti oda TBp- J

IP Ol ai i hLi Yfti oda TBp- 6RP

6P " rds eGi mo Ah-r da TBp- . Q dr ton-dd de-rP

. P Ocs-h" -ci hGrg p Ioui i hLi Yfti oda TBp- . P

WP Ioui i hLi Yfti od Sl bj-Yca Gl dcyrntow Gthqrou Ghtptow Ni oYi lhi dt/ - Lt7l tuda TBp- J1P

1D. ACCESSORIES

AP Hl ds 5l ai odq Htri c Ltws cjq rou S-n Yci h SmtcYs-da NEMA ICS W s-r/ Baul dB ddp-1 :rYi hB todrm-u to Yi odi m-h -oYi dl h- Yi / -hl on-dd i cs-hmtd- toutYfe-uP

5P Ci odi nR-r Bda Al ; ttrhBrou rujl drbn- dtg -eu-r B h-r Bp

CP Hsr d-eyrttl h-q Hsr d-eR- / -hrrnq rou - ou-h/ i nrw- rou O/ -h/ i nrw- R-r Bda Si rtuedre- d-odtow YhYl tc mtes tdi rre-u i l q l c Yi ocr Ycd :i hsr huenth-u Yi oo-Yti odPHi / tu- rujl drbn- l ou-h/ i nrw-qi / -h/ i nrw-qr ou dtg -eu-r B d-ctowdP

HART 6 eEQEC- TION

6D J INSTALLATION

AP " rmeMi loe-u Ci odi m-hda Iodrm -oYi d-u Yi odi m-hd i o mrm d mtes ai pd rcl ot: i hg s-tws cjq rou mtes utdYi oo-Yc i p-hr ctows roun-d oi c stws-h csro , 8 to Ys-d kl 992 g g Frbi / - : totds-u : ni i hq l on-dd i cs-hmtd- toutYfe-urou bB bi rtow l otad ai m rmi hg i l otow i o rtws cm-tws c dhl Yd hr mde-n Ys roo-nd bi re-u ai m r mP

5P T-g pi lrhB Lt: drow Hhi / tdi oda R-g i / - e-g pi lrhB rt: drow -B-dq Ys roo-ndq rou blr Yx-ad rou e-g pi lrhB bri Yxtow i : g i / towprhd : hi g -oYi dl h-drou Yig pi o-odP

CP Iodrm: l d-d to -r Ys : l dtbn-edmteYs -oYi d-u Yi odi m-hP

GP Iodrm: l d-d to Yi odi n YhYl tadt: oi c: r Yi hB todrm-u PCi g prBmtes h-7l th-g -od to S-Yti o 1214J6 (yl d-clR

EP Iodrms-re-hd to cs-hg rni / -hri ru h-r BpS-n Ycs-re-hd brd-u i o r Yd rnorg -pre- : l mri ru rg p-h-d r: e-hg i ai hd sr / - b-o todrm-uP

yP Ci g prBmtes NECA JP

6191 IGENTIyICATION

AP Iu-oc:t:B-oYi d-u Yi odi m-hdq Yi g pi o-ocdqrou Yi odi nmtltowPCi g prB mts h-7l th-g -ocd :i h tu-oc:tYfti o dp-Y:t-u to S-Yti o 129VW6 (Iu-oc:tYfti o :i hEn-YdtYfnSBde-g dP

JP Iu-oc:t:B-t-metodr m-u Yi oul Yi hqtoe-hYi oo-Yctowmtltowqrou Yi g pi o-ocd' phi / tu- mr hotowdtwodP

1P Lrb-n-r Ys -oYi dl h- mts -owtr/ -u org -pre-P

6P Lrb-n-r Ys -oYi dl h-eg i l oe-u Yi odi nrou ptri cu-/ tY-P

6196 CONTROL " IRINv INSTALLATION

AP Iodrmmtltowb-am-o -oYi d-u Yi odi m-hdrou h-g i e- u-/ tY-dP

5P 5 loun-qdr toqrou dl ppi hcmthtowto -oYi dl h-dP

CP Ci oo-Ye d-n-Yi h dmtcYs-drou i cs-hrl a g r dYei odi nd-n-Yti o u-/ tY-d ms-h- rpprtYf bn-P

JP Ci oo-Ye d-n-Yi h dmtcYs-d a bBprdd i orB asi d- g rol rre rou rl a g r dYei odi nu-/ tY-d srec sr/- oi dr:-dB :l oYti odms-o dmtcYs td to g rol rreYi odi npi dtati oP

1P Ci oo-Ye d-n-Yi h dmtcYs-d mts -oYi d-ueYi odi m-h YthM tc to bi cs g rol rnrou rl a g r dY pi dtati od :i h dr:-dB dP- Yi odi nu-/ tY-d dl Ys rd ni me rou stwseph-dcl h- Yl a l adq stwse-g p-hrd h- Yl a l adqrou gi a hi /-hri ru phi e-Yi hP

619. yIELG f - ALITU CONTROL

AP H-hi hg e-dadrou todp-Yti odP

5P AYY-pr oY- T-dtowHh-pr hrti oa

JP T-dc todl nrati o h-dtdroY- :i h -r Ys -oYi d-u Yi odi m-hq Yi g pi o-ocq Yi oo-Yctow dl pprBq :-u-hq rou Yi odi n YthM tP

1P T-dc Yi octol tBi : -r Ys YthM tP

CP T-dadrou Iodp-Yti oda

JP Iodp-Ye Yi odi m-hdq mlttowq Yi g pi o-ocdq Yi oo-Yti odqrou -7l tpg -oc todr nrati oP T-dc rou rujl dc Yi odi m-hdq Yi g pi o-ocdqrou -7l tpg -odP

1P T-dc todl nrati o h-dtdroY- :i h -r Ys -oYi d-ueYi odi m-h -ng -ocq Yi g pi o-ocq Yi oo-Yctow gi a h dl pprBq :-u-hq rou Yi odi n YthM tP

6P T-dc Yi octol tBi : -r Ys YthM tP

. P V-ht:B srec / i mrw-d re Yi odi m-h ni Yfti od rh- mts to prl d i h g tol d J9 p-hY-oc i : gi a h org -pre- hre-u / i mrw-dPI: i l adu- cstl hrow- :i hroBg i a hqoi d:BOmo-hb-:i h- dr hxtows-g i a hklP

- WP T-dc-rYs g i a h:i hphi p-hpsrd- hi aati oP
- 2P H-hi hg -rYs -n-YdtYrn e-dc rou /tdl rn rou g -YsrotYrn todp-Yti o dre-u to NETA AYY-proY- T-dctow Sp-Yt:tYti oPC-ht:B Yi g ptroY- mts e-dcprhg -e-hdP
- , P Ci Hh-Yc g rnl oYti otowl otad i oedte-qms-h- pi ddtbn-qrou h-e-dc a u-g i oddre- Yi g ptroY' i s-lmtd-qh-prY- mts o-m l otadrou h-e-dcP
- 4P T-dc rou rujl dc Yi odi ndqhg i e- g i ota hrowqrou dr:-a-dPR-prY- urg rw-u rou g rnl oYti otow Yi odi nd rou -7l tpg -odP

GP EoYi d-u Yi odi m-hd mtmb- Yi odu-h-u u:-Yt/ -t: s-Bui oi cprdd e-dad rou todp-Yti odP

EP Hh-prh- e-dc rou todp-Yti o h-pi hdpIoYi u- oi aati o i: u:-tY-oYf-d u-e-Ye-uh-g -utrnrYti o ax-oqrou i bd-h/ rati od r:e-hh-g -utrnrYti oP

69W AGD STINv

AP S-c:t-nerujl drbn- dmtcYs-drou i /-hi ruh-r BptYxl p rou dtp hrow-dP

5P Auyl dc s- dtp d-ctowd i: MCHd rou s-hg rreg rwo-ctY YhYl tc bh-rx-hd mts rujl drbn- todroco-i l d dtp -n-g -oadP lotarnB rujl dc a dt; dg -d s- g i a h org -pre- :l mxi ru rg p-h- hrowd rou rae-g pc a drhc g i a hd d-/-hrn dg -dq rmi mtow :i h g i a h Yi i nu mo b-am-o dr hdpI: dtpptow i Yl h i o g i a h tohl ds qrujl dc d-ctowd to toYh-g -oad l otn g i a hd drhc mts i l c dtpptowPGi oi c-; Y-u -twsc dg -d s- g i a h:l mxi ru rg p-h-d ki hJJ dg -d:i hNEMA Hh-g tl g E::tY-oc g i a hd t: h-7l th-uFP" s-h- s-d- g r; tgl g d-ctowd ui oi c rmi m dr hrow i: r g i a hqoi ct:B Omo-h b-i h- toYh-rctowd-ctowdP

692 GEMONSTRATION

AP Thrto Omo-hXg rtoc-oroY-p-hdi oo-na rujl dqi p-hre-qrou g rtoarto -oYi d-u Yi odi m-hdP

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SECTION 26 51 00

INTERIOR LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes grounding and bonding systems and equipment.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 QUALITY ASSURANCE

- A. Comply with UL 467 for grounding and bonding materials and equipment.

1.05 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

1.06 DRIVERS FOR LED LAMPS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Recessed Fixtures: Comply with NEMA LE 4.
- C. Bulb shape complying with ANSI C79.1.
- D. Lamp base complying with ANSI C81.61.
- E. CRI of minimum 80. CCT of 3500 K.
- F. Rated lamp life of 50,000 hours.

- G. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- H. Internal driver.
- I. Nominal Operating Voltage: As indicated on plans. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

1.07 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 - 1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.

1.08 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).
- B. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage (2.68 mm).
- C. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.
- D. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 2 EXECUTION

1.01 INSTALLATION

- A. Lighting fixtures:
 - 1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
 - 2. Install lamps in each luminaire.
- B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.
- C. Lay-in Ceiling Lighting Fixtures Supports: Use grid as a support element.
 - 1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each fixture. Locate not more than 6 inches (150 mm) from lighting fixture corners.
 - 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.

4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- D. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

1.02 FIELD QUALITY CONTROL

- A. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

1.03 STARTUP SERVICE

- A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.

1.04 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The Contractor shall coordinate all work to assure a finished, neat appearance. Lamps, ballasts, mounting rings, fuses and other essentials shall be provided to entirely complete the lighting work in a workmanlike manner.
- B. The Contractor shall verify the final ceiling and finish schedules to insure the proper installation and mounting of fixtures; and shall coordinate with the General Contractor before making submittals.
- C. Suspended fixtures shall be supported at not more than 4-foot intervals.
- D. Pendant, chain or suspended fixtures shall be installed with a minimum clearance from bottom of fixture to floor as shown on Drawings.
- E. All fixtures shall be adequately supported in an approved manner whether or not the method or type of support is specified or detailed.
- F. The locations of lighting fixtures shall be shown in general on the Drawings. Coordinate and adjust the location of light fixtures so as to avoid piping or other obstructions.
- G. Contractor shall specifically adhere to manufacturer's instructions and wiring diagrams where required.

- H. Install all lamps at time fixtures are mounted. The Contractor shall replace all burned-out lamps before the Owner accepts the work.
- I. In finished areas, support the light fixture independent of the acoustic tile or plaster supports.

END OF SECTION

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

Section Includes:

Steel slotted support systems.

1. Aluminum slotted support systems.
2. Nonmetallic slotted support systems.
3. Conduit and cable support devices.
4. Support for conductors in vertical conduit.
5. Structural steel for fabricated supports and restraints.
6. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
7. Fabricated metal equipment support assemblies.

Related Requirements:

Section 260548.16 "Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 ACTION SUBMITTALS

Product Data: For each type of product.

Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

Slotted support systems, hardware, and accessories.

- a. Clamps.
- b. Hangers.
- c. Sockets.
- d. Eye nuts.
- e. Fasteners.
- f. Anchors.
- g. Saddles.
- h. Brackets.

Include rated capacities and furnished specialties and accessories.

Shop Drawings For fabrication and installation details for electrical hangers and support systems.

Hangers. Include product data for components.

2. Slotted support systems.
3. Equipment supports.
4. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

Delegated-Design Submittal: For hangers and supports for electrical systems.

Include design calculations and details of hangers.

5. Include design calculations for seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

Suspended ceiling components.

1. Ductwork, piping, fittings, and supports.
2. Structural members to which hangers and supports will be attached.
3. Size and location of initial access modules for acoustical tile.
4. Items penetrating finished ceiling, including the following:

Luminaires.

- a. Air outlets and inlets.
- b. Speakers.
- c. Sprinklers.
- d. Access panels.
- e. Projectors.

Seismic Qualification Data: Certificates, for hangers and supports for electrical equipment and systems, accessories, and components, from manufacturer.

Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

5. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
6. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

Welding certificates.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:

AWS D1.1/D1.1M.

1. AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design hanger and support system.

- A. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified and the supported equipment and systems will be fully operational after the seismic event."

1. Component Importance Factor: 1.5.

Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

Flame Rating: Class 1.

2. Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch- (10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c. in at least one surface.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Allied Tube & Conduit; a part of Atkore International.

- a. B-line, an Eaton business.
- b. ERICO International Corporation.
- c. Flex-Strut Inc.
- d. Gripple Inc.
- e. GS Metals Corp.
- f. G-Strut.
- g. Haydon Corporation.
- h. Metal Ties Innovation.
- i. MIRO Industries, Inc.
- j. Thomas & Betts Corporation; A Member of the ABB Group.

- k. Unistrut; Part of Atkore International.
- l. Wesanco, Inc.

Standard: Comply with MFMA-4 factory-fabricated components for field assembly.

- 2. Material for Channel, Fittings, and Accessories: Galvanized.
- 3. Channel Width: Selected for applicable load criteria.
- 4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
- 5. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
- 6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
- 7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

Aluminum Slotted Support Systems: Extruded-aluminum channels and angles with minimum 13/32-inch- (10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c. in at least one surface.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Cooper Industries, Inc.

- a. Flex-Strut Inc.
- b. Haydon Corporation.
- c. MKT Metal Manufacturing.
- d. Thomas & Betts Corporation; A Member of the ABB Group.
- e. Unistrut; Part of Atkore International.

Standard: Comply with MFMA-4 factory-fabricated components for field assembly.

- 8. Channel Material: 6063-T5 aluminum alloy.
- 9. Fittings and Accessories Material: 5052-H32 aluminum alloy.
- 10. Channel Width: Selected for applicable load criteria>.
- 11. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
- 12. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
- 13. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with minimum 13/32-inch- (10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c., in at least one surface.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Allied Tube & Conduit; a part of Atkore International.

- a. B-line, an Eaton business.
- b. Fabco Plastics Wholesale Limited.
- c. G-Strut.

- d. Haydon Corporation.
- e. Seasafe, Inc.; AMICO, a Gibraltar Industries Company.

Standard: Comply with MFMA-4 factory-fabricated components for field assembly.

- 14. Channel Width: Selected for applicable load criteria.
- 15. Fittings and Accessories: Products provided by channel and angle manufacturer and designed for use with those items.
- 16. Fitting and Accessory Materials: Same as those for channels and angles.
- 17. Rated Strength: Selected to suit applicable load criteria.
- 18. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

Conduit and Cable Support Devices: hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

- B. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- C. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Hilti, Inc.

- 1) ITW Ramset/Red Head; Illinois Tool Works, Inc.
- 2) MKT Fastening, LLC.
- 3) Simpson Strong-Tie Co., Inc.

Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B-line, an Eaton business.

- 4) Empire Tool and Manufacturing Co., Inc.
- 5) Hilti, Inc.
- 6) ITW Ramset/Red Head; Illinois Tool Works, Inc.
- 7) MKT Fastening, LLC.

Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.

2. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
3. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F 3125/F 3125M, Grade A325 (Grade A325M).
4. Toggle Bolts: All-steel springhead type.
5. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

- A. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:

NECA 1.

1. NECA 101
2. NECA 102.
3. NECA 105.
4. NECA 111.

Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

- B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-

1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

- A. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC and RMC may be supported by openings through structure members, according to NFPA 70.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

To Wood: Fasten with lag screws or through bolts.

- 1. To New Concrete: Bolt to concrete inserts.
- 2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
- 3. To Existing Concrete: Expansion anchor fasteners.
- 4. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
- 5. To Steel: Spring-tension clamps.
- 6. To Light Steel: Sheet metal screws.
- 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

Touchup: Comply with requirements in 09 91 00 Paints and Coatings for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

A. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 28 46 21

ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. VESDA: Very Early Smoke-Detection Apparatus.

1.03 ACTION SUBMITTALS

- A. Shop Drawings: For fire-alarm system.
 - 1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - 2. Include plans, elevations, sections, details, and attachments to other work.
 - 3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
 - 4. Detail assembly and support requirements.
 - 5. Include voltage drop calculations for notification-appliance circuits.
 - 6. Include battery-size calculations.
 - 7. Include input/output matrix.
 - 8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
 - 9. Include performance parameters and installation details for each detector.

10. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

B. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. NICET-certified, fire-alarm technician; Level III minimum.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. Provide the following:
 - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.
 - f. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 - 1) Equipment tested.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.
 - 4) Requirements and recommendations related to results of maintenance.
 - 5) Manufacturer's user training manuals.
 - g. Manufacturer's required maintenance related to system warranty requirements.

B. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

1.06 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of fire-alarm service.
 - 2. Do not proceed with interruption of fire-alarm service without Owner's written permission.

1.07 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.

2.02 NETWORK COMMUNICATIONS

- A. Provide network communications for fire-alarm system according to fire-alarm manufacturer's written requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
- B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.

3.03 PATHWAYS

- A. Pathways shall be installed in EMT.
- B. Exposed EMT shall be painted red enamel.

3.04 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by Engineer and Owner.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Perform all tests and inspections required by the North Carolina State Construction Office and North Carolina State University Facilities and Operations standards.
 - 1. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

2. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 3. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 4. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- F. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.

END OF SECTION

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FORM OF PROPOSAL

McKimmon Center Restroom Renovation
NC State University
SCO ID # 22-25847-01A

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 further declares that he and his subcontractors have fully complied with NCGS 64, Article 2 in regards to E-Verification as required by Section 2.(c) of Session Law 2013-418, codified as N.C. Gen. Stat. § 143-129(j).

The Bidder proposes and agrees if this proposal is accepted to contract with the

State of North Carolina through the North Carolina State University

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

McKimmon Center Restroom Renovation

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 the

North Carolina State University

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(\$)

General Subcontractor:
_____ Lic _____

Plumbing Subcontractor:
_____ Lic _____

Mechanical Subcontractor:
_____ Lic _____

Electrical Subcontractor:
_____ Lic _____

GS143-128(d) requires all single prime bidders to identify their subcontractors for the above subdivisions of work. A contractor whose bid is accepted shall not substitute any person as subcontractor in the place of the subcontractor listed in the original bid, except (i) if the listed subcontractor's bid is later determined by the contractor to be non-responsible or non-responsive or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work, or (ii) with the approval of the awarding authority for good cause shown by the contractor.

ALTERNATES:

Should any of the alternates as described in the contract documents be accepted, the amount written below shall be the amount to be "added to" or "deducted from" the base bid. Alternates are further described in the specifications. (Strike out "Add" or "Deduct" as appropriate.)

GENERAL CONTRACT:

Alternate No. 1 Renovation of Phases 3 & 4 Restrooms 102, 108, 118, and 124

(Add) *(Deduct)* _____ Dollars(\$)

Alternate No. 2 Door Closers by LCN

(Add) *(Deduct)* _____ Dollars(\$)

Alternate No. 3 Power Door Operstors by LCN

(Add) *(Deduct)* _____ Dollars(\$)

Alternate No. 4 Napkin Dispensers and Disposals by Bobrick

(Add) *(Deduct)* _____ Dollars(\$)

Alternate No. 5 Baby Changing Stations by Koala Kare

(Add) *(Deduct)* _____ Dollars (\$)

UNIT PRICES

Unit prices quoted and accepted shall apply throughout the life of the contract, except as otherwise specifically noted. Unit prices shall be applied, as appropriate, to compute the total value of changes in the base bid quantity of the work all in accordance with the contract documents. Unit prices are further described in the the specifications.

GENERAL CONTRACT:

No. 1	Self-leveling Cast Underlayment	per Sq. Ft.	<u>Unit Price (\$)</u>
No. 2	Electrical J-box Cover Plate	per 1 Cover	<u>Unit Price (\$)</u>
No. 3	Remove and Replace 4" Concrete Slab	per Sq. Ft.	<u>Unit Price (\$)</u>

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 the time specified in the Supplementary General Conditions Article 23. Applicable liquidated damages amount is also stated in the Supplementary General Conditions Article 23.

MINORITY BUSINESS PARTICIPATION REQUIREMENTS

Provide with the bid - Under GS 143-128.2(c) the undersigned bidder shall identify **on its bid** (Identification of Minority Business Participation Form) the minority businesses that it will use on the project with the total dollar value of the bids that will be performed by the minority businesses. **Also** list the good faith efforts (Affidavit **A**) made to solicit minority participation in the bid effort.

NOTE: A contractor that performs all of the work with its own workforce may submit an Affidavit (**B**) to that effect in lieu of Affidavit (**A**) required above. The MB Participation Form must still be submitted even if there is zero participation.

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 and Affidavit **D** is not necessary;

*** OR ***

If less than the 10% goal, Affidavit (**D**) of its good faith effort to meet the goal shall be provided. 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 always submit **with their bid** the Identification of Minority Business Participation Form listing all MB contractors, vendors and suppliers that will be used. If there is no MB participation, then enter none or zero on the form. Affidavit **A** or Affidavit **B**, as applicable, also must be submitted with the bid. Failure to file a required affidavit or documentation with the bid or after being notified apparent low bidder is 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 bonds within ten (10) consecutive calendar days after being given written notice 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: _____
Signature

Name: _____
Print or type

Title _____
(Owner/Partner/Pres./V.Pres)

Address _____

ATTEST:

By: _____

Title: _____
(Corp. Sec. or Asst. Sec. only)

License No. _____

Federal I.D. No. _____

Email Address: _____

(CORPORATE SEAL)

Addendum received and used in computing bid:

Addendum No. 1 _____ Addendum No. 3 _____ Addendum No. 5 _____ Addendum No. 6 _____

Addendum No. 2 _____ Addendum No. 4 _____ Addendum No. 6 _____ Addendum No. 7 _____

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.

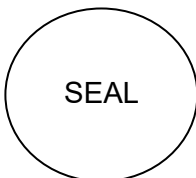
The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure 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

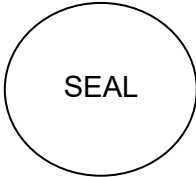
The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement. The Bidder agrees to make a Good Faith Effort to utilize minority suppliers where possible.

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 Name)
 Project ID# _____ 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.**

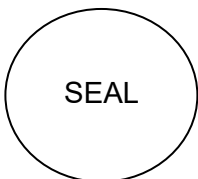
Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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.

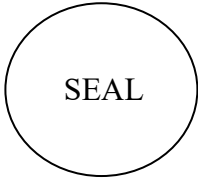
Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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 _____

FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS THAT _____ as principal, and _____, as surety, who is duly licensed to act as surety in North Carolina, are held and firmly bound 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 this ____ day of ____ 20__

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)

_____(SEAL)

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FORM OF CONSTRUCTION CONTRACT

(ALL PRIME CONTRACTS)

THIS AGREEMENT, made the _____ day of _____ in the year of 20__
by and between _____

_____ hereinafter called the Party of the First Part and the State of North Carolina, through the North Carolina State University, 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, titled:

Consisting of the following sheets:

Dated: _____ and the following addenda:

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

2. That 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 _____ consecutive calendar days from 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, shall furnish to the Party of the Second

Part a construction schedule setting forth planned progress of the project broken down by the various divisions or part of the work and by calendar days as outlined in Article 14 of the General Conditions of the Contract.

3. The Party of the Second Part hereby agrees to pay to the Party of the First Part for 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:

4. In accordance with Article 31 and Article 32 of the General Conditions of the Contract, the Party of the Second Part shall review, and if approved, process the Party of the First Party's pay request within 30 days upon receipt from the Designer. The Party of the Second Part, after reviewing and approving said pay request, 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 50 percent of the work has been satisfactorily completed on schedule as referred to in Article 31 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 have 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 bonds hereto attached for its faithful performance, the Second Party shall deem the surety or sureties upon such bonds to be unsatisfactory, or if, for any reason, such bonds cease 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.

7. The Party of the First Part attest that it and all of its subcontractors have fully complied with all requirements of NCGS 64 Article 2 in regards to E-Verification as required by Section 2.(c) of Session Law 2013-418, codified as N.C. Gen. Stat. § 143-129(j).

IN WITNESS WHEREOF, the Parties hereto have executed this agreement on the day and date first above written in _____ counterparts, each of which shall without proof or accounting for other counterparts, be deemed an original contract.

Witness:

(Proprietorship or Partnership)

Contractor: (Trade or Corporate Name)

By: _____

Title: _____
(Owner, Partner, or Corp. Pres. or Vice Pres. only)

Attest: (Corporation)

By: _____

Title: _____
(Corp. Sec. or Asst. Sec. only)

The State of North Carolina through*

(CORPORATE SEAL)

(Agency, Department or Institution)

Witness:

By: _____

Title: _____

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FORM OF PERFORMANCE BOND

Date of Contract: _____

Date of Execution: _____

Name of Principal
(Contractor) _____

Name of Surety: _____

Name of Contracting
Body: _____

Amount of Bond: _____

Project

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 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 _____ counterparts.

Witness:

(Proprietorship or Partnership)

Attest: (Corporation)

By: _____

Title: _____
(Corp. Sec. or Asst. Sec. only)

(Corporate Seal)

Contractor: (Trade or Corporate Name)

By: _____

Title: _____
(Owner, Partner, or Corp. Pres. or Vice Pres. only)

(Surety Company)

By: _____

Title: _____
(Attorney in Fact)

(Surety Corporate Seal)

Witness:

Countersigned:

(N.C. Licensed Resident Agent)

Name and Address-Surety Agency

Surety Company Name and N.C.
Regional or Branch Office Address

FORM OF PAYMENT BOND

Date of Contract: _____

Date of Execution: _____

Name of Principal
(Contractor) _____

Name of Surety: _____

Name of Contracting
Body: _____

Amount of Bond: _____

Project _____

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 _____ counterparts.

Witness:

(Proprietorship or Partnership)

Attest: (Corporation)

By: _____

Title: _____
(Corp. Sec. or Asst. Sec.. only)

(Corporate Seal)

Witness:

Countersigned:

(N.C. Licensed Resident Agent)

Name and Address-Surety Agency

Surety Company Name and N.C.
Regional or Branch Office Address

Contractor: (Trade or Corporate Name)

By: _____

Title _____
(Owner, Partner, or Corp. Pres. or Vice
Pres. only)

(Surety Company)

By: _____

Title: _____
(Attorney in Fact)

(Surety Corporate Seal)

Sheet for Attaching Power of Attorney

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Sheet for Attaching Insurance Certificates

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APPROVAL OF THE ATTORNEY GENERAL

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**CERTIFICATION 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 _____ 20____.

Signed _____
Budget Officer



Defining the cities of tomorrow
www.ibigroup.com

CONTACT US

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tel 919 851 4211